

1999

## Report on Aviation Safety Committee on Aeronautics of the Association of the Bar of the City of New York

Shephard W. Melzer

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**REPORT ON AVIATION SAFETY COMMITTEE ON  
AERONAUTICS OF THE ASSOCIATION OF THE BAR  
OF THE CITY OF NEW YORK\* \*\* \*\*\***

SHEPHARD W. MELZER

**PREFACE TO REPORT ON AVIATION SAFETY**

**T**HE FOLLOWING REPORT on aviation safety was originally prepared in June 1998 by the Committee on Aeronautics of the Association of the Bar of the City of New York and was published in the July-August 1998 issue of the Record of the Association. Since its original publication, there have been certain developments in the area of aviation safety which illustrate both the efforts to meet some of the concerns addressed in the report, and suggest methods for improving such efforts.

On the positive side, the skies have become safer for passengers on airplanes operated by U.S. carriers. The year 1998 was marked as one of the safest times in the history of the airline industry, with no passenger fatality reported in accidents involv-

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\* Shephard W. Melzer, Chair; Susan Sullivan Bisceglia, Secretary; Arthur Schiff, Treasurer; John D. Clemen; Jeanine C. Dore; Thomas Allan Eff; Colm M. Glass; C. Martin Goldenberg; Frank H. Granito III; Alvin Green; Alfred C. Jones III; Alfred C. Jones; Richard Hand Kessler; Douglas A. Latto; Michael C. Mulitz; Stephen G. Nordquist; Albert J. Pucciarelli; Steven C. Rickman; Peter Safirstein; Anthony Michael Sabino; Ivars R. Slokenbergs

\*\* The Aeronautics Committee would like to thank the following individuals for their assistance in preparing this report: Jonathan N. Santelli, Associate, Rogers & Wells L.L.P.; J. Francis Cooke, Associate, Rogers & Wells L.L.P.; Kimberly S. Loepp, Summer Associate, Rogers & Wells L.L.P.; and Michelle Brown, Former Associate, Rogers & Wells L.L.P.

\*\*\* The Aeronautics Committee expresses its appreciation to the following individuals for their contributions in providing important information for this report: Phil Boyer, President, Aircraft Owners and Pilots Association; Arlene Feldman, Regional Administrator, Federal Aviation Administration; Al Graser, Assistant Director of Airports, Port Authority of New York and New Jersey; Robert Kelley, Director of Airports, Port Authority of New York and New Jersey; Gary Kitley, Executive Director of the Council on Aviation Accreditation; and Joseph Montone, FAA Designated Examiner, and Part 121 Check Airmen and Instructor.

ing U.S. airlines' aircraft, with this streak of good fortune continuing through May of this year.<sup>1</sup> This excellent record was accompanied by an impressive reduction in the number of accidents involving aircraft operated by U.S. airlines,<sup>2</sup> while the federal government's Y2K preparation resulted in the first successful test-flight using modified control equipment earlier this year, ensuring safe passage into the next millennium.<sup>3</sup>

In addition, the federal government is putting into practice measures to reduce aircraft accidents based on the findings of the White House Commission on Aviation Safety and Security, which identified controlled-flight-into-terrain, loss of control, uncontained engine failures, runway incursion, approach and landing, and adverse weather conditions as major causes of accidents.<sup>4</sup> At the same time, the Congress is turning its attention to aviation safety issues with proposals for increasing funding for safety administration and for enacting stricter enforcement measures. For example, a bill currently under consideration in the House would double funding of the Federal Aviation Administration (FAA) in the next five years,<sup>5</sup> while several bills being debated in the Senate and the House would implement long-awaited measures against bogus aircraft parts,<sup>6</sup> provide protection for whistleblowers within the federal government,<sup>7</sup> institute the Wide-Area-Augmentation-System, and establish an aircraft repair and advisory panel.<sup>8</sup>

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<sup>1</sup> National Transportation Safety Board, Official Internet Site, *NTSB Statistics Show 1998 Was First Year with No Passenger Death on U.S. Airlines*, (Mar. 2, 1999) <<http://www.nts.gov/pressrel/1999/990302.html>>.

<sup>2</sup> *Id.*

<sup>3</sup> Aviation International News//Online, *FAA Passes Y2K Test of Air Traffic Systems*, (visited May 20, 1999) <[http://www.ainonline.com/may\\_faay2k\\_5.html](http://www.ainonline.com/may_faay2k_5.html)>.

<sup>4</sup> Federal Aviation Administration, *New Safety Program Unveiled: Safer Skies-A Focused Agenda*, (Apr. 14, 1998) <[http://www.faa.gov/apa/Safer\\_Skies/chart.html](http://www.faa.gov/apa/Safer_Skies/chart.html)>.

<sup>5</sup> ABC News.com, *House Committee OK's Boost for Aviation*, (Mar. 11, 1999) <[http://abcnews.go.com/sections/us/DailyNews/Passenger\\_rights990311.html](http://abcnews.go.com/sections/us/DailyNews/Passenger_rights990311.html)>.

<sup>6</sup> Library of Congress, Bill Summary & Status for the 106th Congress, S 82 RS (visited May 20, 1999) <<http://thomas.loc.gov/cgi-bin/query/D?c106:4:/temp/~c106apxFW3::>>>.

<sup>7</sup> Library of Congress, Bill Summary & Status for the 106th Congress, S 648 IS (visited May 20, 1999) <<http://thomas.loc.gov/cgi-bin/query/C?c106:/temp/~c106sE04U9>>; see also Library of Congress, Bill Summary & Status for the 106th Congress, H.R. 953 (visited May 20, 1999) <<http://thomas.loc.gov/cgi-bin/bdquery/z?d106:HR00953:@@X>>.

<sup>8</sup> Library of Congress, Bill Summary & Status for the 106th Congress, S 82 RS, (visited May 20, 1999) <<http://thomas.loc.gov/cgi-bin/query/D?c106:4:/temp/~c106apxFW3::>>>.

On the other hand, accidents have not completely disappeared, as demonstrated by the runway accident involving American Airlines Flight 1420 on June 1st of this year at Little Rock, Arkansas, in which nine people died and several dozens were injured.<sup>9</sup> The cause of the accident is not fully identified yet pending the outcome of the current investigation. But, several issues have been highlighted, such as possible mechanical failure of spoilers at landing, bad weather and pilot fatigue, among others, while the human deaths and injuries may have been increased due to loose and unsecure seats inside the aircraft.<sup>10</sup>

As the Arkansas accident demonstrates, certain mechanical problems continue to haunt the aviation industry, such as the continuing problem of rudders of B-737s even after modifications,<sup>11</sup> and the unsafe electrical wiring of B-727s despite efforts to improve safety procedures.<sup>12</sup> At the same time, as the recent Congressional hearing on the investigation of the crash of the TWA Flight 800 demonstrates,<sup>13</sup> there are problems with inter-agency coordination among the various federal agencies in their investigation of airplane accidents and implementation of improved safety measures. This problem of coordination highlights the limitations in the federal government's ability to identify the causes of accidents in a timely manner and, as a result, to promptly remedy aircraft mechanical deficiencies to prevent similar accidents. Such was the case with the delay in the investigation of an emergency landing of a Metrojet B-737 in February of this year, an investigation hampered by a flight recorder that did not have all the necessary information for determining the cause of the problem. This problem could have been alleviated by the FAA four years ago when the National Transportation Safety Board made its recommendation for up-

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<sup>9</sup> CNN, *Deaths Confirmed After Airliner Skids Off Runway; 80 Injured*, (June 2, 1999) <<http://www.cnn.com/US/9906/02/arkansas.crash.01/html>>.

<sup>10</sup> Newsweek, *We Shouldn't Be Landing*, (June 14, 1999) <[Newsweek.com/nw-srv/issue/24-99a/printed/US/na/na0124\\_2htm](http://Newsweek.com/nw-srv/issue/24-99a/printed/US/na/na0124_2htm)>.

<sup>11</sup> ABC News, *737 Problem Persists*, (Mar. 15, 1999) <<http://more.abcnews.go.com/sections/travel/DailyNews/rudderprobs.html>>.

<sup>12</sup> CNN, *FAA Orders Emergency Inspection of Boeing 727s*, (May 22, 1999) <<http://cnn.com/TRAVEL/NEWS/9905/22/faa.727/>>.

<sup>13</sup> Washington Post, *FBI Probe of the TWA Crash Criticized at Hill Hearing*, (May 11, 1999) <<http://search.washingtonpost.com/w...te/1999-05/11/0381-051199-idx.html>>.

grading flight recorder capability on all B-737s, based on its investigation of earlier accidents.<sup>14</sup>

There are other pressing issues that have not been addressed yet either by the federal government or by the airline industry. Security at airports continues to be problematic despite years of warning by various federal agencies,<sup>15</sup> while the problem of air traffic control sector workload and aging equipment have led to several near mid-air accidents in the past year alone,<sup>16</sup> the latest example occurring in Philadelphia in May of this year.<sup>17</sup> The FAA turned its attention to the issue of pilot fatigue only recently, after a union representing American Airline pilots urged it to enforce existing regulations to provide adequate rest periods for pilots, in the wake of the Arkansas accident.<sup>18</sup> Handling of hazardous materials remains an important area of safety concern even though the investigations into the accidents involving a FedEx DC-10 and a Value Jet DC-9 in 1996, point to the lack of safety precautions as a probable cause of these accidents.<sup>19</sup>

Legal costs of each aircraft accident have been on the rise in the past twelve month period. The ranks of plaintiffs in enormously complex class action suits by victims of Swissair and the TWA Flight 800 currently being litigated were recently joined by a suit filed by victims of American Airlines Flight 1420, only a week after the accident took place.<sup>20</sup> Meanwhile, member countries of the International Civil Aviation Organization agreed to

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<sup>14</sup> Jim Hall, Chairman of NTSB, Statement Related to Flight Recorders Aboard B-737 involved in Yesterday's Emergency Landing, National Transportation Safety Board, (Feb. 24, 1999) <<http://www.nts.gov/pressrel/1999/990224.html>>.

<sup>15</sup> ABC News, *Airport Security Lapses Found*, (Mar. 11, 1999) <<http://more.abcnews.go.com/section...ilyNews/airportsecurity990311.html>>.

<sup>16</sup> See National Transportation Safety Board, *Operational Error at Cleveland Air Traffic Control Center*, (Aug. 14, 1998) <<http://www.nts.gov/pressrel/1998/980814.html>>.

<sup>17</sup> CNN, *Airport Radar System comes under Scrutiny*, (May 23, 1999) <<http://www.cnn.com/US/9905/23/AM-AirportRadarFailure.ap/>>; see also National Transportation Safety Board, Official Internet Site, "LaGuardia Airport Near Mid-Air Collision," (Jun. 5, 1998) <<http://www.nts.gov/pressrel/980605.html>>.

<sup>18</sup> CNN, *U.S. Puts Airlines on Notice Over Pilot Duty Times*, (June 11, 1999) <<http://cnn.com/US/9906/11/BC-AIRLINES-SAFETY.ret/>>.

<sup>19</sup> See National Transportation Safety Board, *NTSB Calls for More Aggressive Action on Hazardous Materials in Air Cargo Shipments*, (Jul. 21, 1998) <<http://nts.gov/pressrel/1998/980721.html>>; National Transportation Safety Board, *Update — United Airlines and Metrojet B-737 Events*, (Mar. 12, 1999) <<http://www.nts.gov/pressrel/1999/990312/html>>.

<sup>20</sup> CNN, *Texas Crash Survivor Files Suit Against American Airlines*, (June 12, 1999) <<http://cnn.com/US/9906/11/PlaneCrash-Lawsuit.ap/>>.

replace the 70 year-old Warsaw Convention limiting venues and compensation to victims of aircraft accidents with a new international treaty which introduces a no-fault compensation scheme with a maximum of \$135,000 in damages per passenger with the possibility of recovery of additional damages in cases where the airline is at fault.<sup>21</sup> Although the new treaty does not affect U.S. airlines in domestic cases because of the existing high liability standards in the U.S., foreign carriers are more likely to be exposed to higher damages and legal costs.<sup>22</sup>

Given the many areas of aviation safety that are in need of regulatory attention, it remains to be seen whether the current trend towards safer air travel will influence reforms and remedies in more problem areas while the legal and business consequences to the airline industry of safety issues will continue to remind the industry, government agencies and the flying public of the high price that such issues bring.

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<sup>21</sup> Christopher J. Chipello, *Accord is reached to Increase Liability, Remove Low Caps for Plan Accidents*, Wall St. J., Jun. 1, 1999, at B 8.

<sup>22</sup> *Id.*

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## I. INTRODUCTION

One of the most important public issues today is the issue of aviation safety. Newspapers, periodicals, and many news broad-

casts inundate the public with alternating reports on increasing safety or the absence thereof. Recently, the Aeronautics Committee of the Association of the Bar of the City of New York sponsored a public forum addressing various safety issues facing the aviation industry. This report is an outgrowth of the forum, and expands on many of the topics discussed there. The report begins with an overview of the air travel industry, including the applicable regulatory structure and a statistical analysis of the safety hazards inherent in flying. Although air travel is among the safest ways to travel and it continues to grow safer even as air traffic increases, a number of problems persist. This report deals with some of those problems. It considers the following significant issues of aviation safety: (i) a common cause of aircraft accidents—controlled flight into terrain (CFIT); (ii) the importance of pilot training in reducing aircraft accidents; (iii) the problem of language barriers between pilots and air traffic controllers; (iv) the existing problems affecting the air traffic management system and air traffic controllers, including the Year 2000 issue; (v) bogus or unapproved aircraft parts; (vi) the role of flight data recorders in aircraft accident investigation and prevention; (vii) the transport of hazardous materials; (viii) the recent ValuJet disaster and some of the issues it brought into the public spotlight; (ix) the problem of terrorism as it affects airline travel; (x) explosive fuel/air mixtures and potential ignition sources inside fuel tanks; and (xi) aging aircraft issues brought into the forefront by the destruction of TWA Flight 800. The subject of aviation safety in general and the foregoing safety issues in particular have important legal implications for airlines, airline passengers and regulatory agencies both in terms of responsibility for aviation safety measures and liability for aircraft accidents. This report will explore these issues, review current safety measures and liabilities, and make recommendations for improvements in aviation safety.

## II. OVERVIEW

### A. THE AVIATION INDUSTRY IN THE UNITED STATES

Air travel in the United States is an enormous industry. There are more than 35,000 aircraft flights in this country each day,<sup>23</sup>

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<sup>23</sup> Interview with Robert Kelly, Director of Airports, and Al Graser, Assistant Director of Airports, Port Authority, of New York and New Jersey (Jan. 16, 1998).



with "an active. . . aviation fleet of more than 180,000 aircraft."<sup>24</sup> However, out of the 180,000 airplanes, only 5000 are airliners.<sup>25</sup> The airlines operate out of approximately 600 airports, with 75% of their operations out of only 30 "hub" airports. In total, though, there are 17,000 public use landing sites in the United States.<sup>26</sup> The National Transportation Safety Board (NTSB) has reported that our air traffic control system "handles over 220 million flight operations annually."<sup>27</sup> The aviation sector currently contributes about 6% to the United States Gross Domestic Product, and could contribute an additional \$100 billion by the year 2007.<sup>28</sup> The industry as a whole supports 8 million jobs in this country.<sup>29</sup> The Federal Aviation Administration (FAA) estimates that air travel will double over the next 20 years, with an annual average growth rate of 4 - 6% per year.<sup>30</sup> By the end of this period, the FAA estimates that airlines around the world will be transporting two and a half billion passengers per year.<sup>31</sup> In order to handle this increased activity, airlines will have to double the existing fleet of aircraft, purchasing between 15,000 and 17,000 new planes by the year 2016.<sup>32</sup> Of these, between 5000 and 7000 will be needed to replace aging aircraft; the remainder—10,000 planes—will be required to handle the increase in air traffic.<sup>33</sup> Moreover, if the current accident rate continues, coupled with expectations of increases in the number of flights to take place around the world in the next century,

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<sup>24</sup> Jane F. Garvey, Remarks at the National Business Aviation Association Annual Meeting (Sept. 23, 1997) (transcript available at <<http://www.dot.gov/affairs/1997/92397jfg.htm>>).

<sup>25</sup> See *id.*

<sup>26</sup> Telephone Interview with Phil Boyer, President, Aircraft Owners and Pilots Association (Dec. 12, 1997).

<sup>27</sup> National Transportation Safety Board Press Release (Jan. 23, 1996) (available at <<http://www.nts.gov/Pressrel/960123.htm>>).

<sup>28</sup> See David Hinson, Remarks at the FAA Annual Forecast Conference (Mar. 5, 1996) (transcript available at <<http://www.faa.gov/apa/speeches/aoa/forecast.htm>>).

<sup>29</sup> See David Hinson, Remarks at the Lehman Brothers Transportation Conference (Jan. 31, 1996) (transcript available at <<http://www.faa.gov/apa/speeches/aoa/lehpr.htm>>).

<sup>30</sup> See *id.*; see also Honorable Jim Hall, Remarks before the Subcommittee on Transportation and Related Agencies (Feb. 11, 1998) (transcript available at <<http://www.nts.gov/speeches/jh980211.htm>>).

<sup>31</sup> See Hinson, *supra* note 6.

<sup>32</sup> See *id.*

<sup>33</sup> See *id.*

tragic accidents may increase in frequency.<sup>34</sup> We have to bring the aircraft accident rate down, and zero is the only acceptable goal.<sup>35</sup>

## B. REGULATION OF THE AVIATION INDUSTRY

The primary regulator of the aviation industry in the United States is the FAA. The FAA's predecessor, the Federal Aviation Agency, was created by the Federal Aviation Act of 1958.<sup>36</sup> When the Department of Transportation (DOT) was created in 1967, the Federal Aviation Agency was put under the DOT and renamed the Federal Aviation Administration. The FAA provides traffic control for aircraft flying over United States airspace. In addition, and among other things, the FAA: (i) oversees the safety of planes and airports; (ii) reviews the credentials and competency of pilots and mechanics; (iii) oversees aviation security; (iv) conducts research programs related to safety and security; (v) provides mandatory safety rules; and (vi) conducts safety inspections.<sup>37</sup>

The NTSB began operation on April 1, 1967. Until 1975, the NTSB received funding from the Department of Transportation. The Independent Safety Board Act of 1975 severed all ties between the NTSB and the DOT. The NTSB is now an independent federal agency charged with both "investigating every civil aviation accident in the United States and significant accidents in the other modes of transportation. . . and issuing safety recommendations aimed at preventing future accidents."<sup>38</sup> Since 1967, the NTSB has investigated more than 100,000 aviation accidents, and has issued more than 10,000 recommendations concerning transportation safety. Although the NTSB has no regulatory authority, its influence is such that over 80% of these recommendations have been adopted in some form.<sup>39</sup>

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<sup>34</sup> *Improving Airline Safety* (CNN television broadcast, Dec. 11, 1997); [hereinafter Burnett] (featuring Jim Burnett, former NTSB Chairman, on Larry King Live).

<sup>35</sup> See *id.*

<sup>36</sup> See Federal Aviation Administration, *A Brief History of the Federal Aviation Administration* (visited Feb. 9, 1999) <<http://www.faa.gov/history.htm>>.

<sup>37</sup> See Federal Aviation Administration, *The Aviation Safety System* (visited Feb. 9, 1999) <<http://www.faa.gov/publicinfo.htm>>. [hereinafter *The Aviation Safety System*]

<sup>38</sup> National Transportation and Safety Board, *History and Mission* (visited Feb. 9, 1999) <[http://www.ntsbt.gov/Abt\\_NTSB/history.htm](http://www.ntsbt.gov/Abt_NTSB/history.htm)>.

<sup>39</sup> See *id.*

### C. HOW SAFE IS FLYING?

Statistically speaking, flying in an aircraft is extremely safe. The NTSB has reported that the fatal accident rate for United States airlines during 1996 was 0.026 per 100,000 aircraft hours.<sup>40</sup> At that rate, a passenger would have to fly twenty-four hours a day for over 438 years before being involved in a fatal crash.<sup>41</sup> Put another way, in 1995, 175 people died in airline accidents. Nearly five times as many people lost their lives in boating, bicycle, and tricycle accidents.<sup>42</sup> Nearly ten times as many people died in swimming accidents, and 250 times more people perished in motor vehicle accidents.<sup>43</sup>

Though, statistically speaking, aircraft flight is quite safe, aircraft safety is an issue of great concern to the American people. The explosion and crash of TWA Flight 800 provoked nationwide grief and horror on a scale unrivaled in recent history.<sup>44</sup> Perhaps the most unsettling aspect of such incidents is that it is often demonstrated that they could have been avoided. As will be discussed below, the industry is currently plagued by a number of safety problems. Most of the major accidents in our recent history can be traced to one of these problems. The tremendous increase in air travel expected over the next twenty years will put a greater strain on the various elements of the aircraft safety system. It is therefore imperative that we address these failings immediately.

### D. POTENTIAL LIABILITY ISSUES

The failings in our current system present significant potential liability exposure for aircraft owners, aircraft operators, and the federal government. If aircraft owners and/or aircraft operators fail to comply with existing safety guidelines, fail to implement recommended safety measures, or otherwise fail to exercise due care, they may expose themselves to lawsuits from passengers and their families. The government also is not immune from legal repercussions; if government employees fail to exercise due care in fulfilling their official non-discretionary duties, the United States may face liability under the U.S. Torts Claims Act, in which the Federal government waives its immu-

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<sup>40</sup> See *The Aviation Safety System*, *supra* note 37.

<sup>41</sup> See *id.*

<sup>42</sup> See *id.*

<sup>43</sup> See *id.*

<sup>44</sup> See *infra* notes 40-43 and accompanying text.

nity to tort liability in the conduct of many of its functions. Given the hundreds of lives that can be lost in a single aircraft accident, the potential liability exposure is enormous.

### III. CONTROLLED FLIGHT INTO TERRAIN

#### A. PROBLEMS

CFIT is a significant accident categorization, cited as the cause of most aircraft accidents.<sup>45</sup> CFIT results when an airplane suddenly deviates from its normal flight pattern and flies into terrain. A CFIT accident is one in which "an otherwise-serviceable aircraft, under control of the crew, is flown (unintentionally) into terrain, obstacles or water, with no prior awareness on the part of the crew of the impending collision."<sup>46</sup> "The Boeing 757 Cali accident (CALI) was an example of CFIT"<sup>47</sup> and, most recently, the NTSB has been investigating the Boeing 747-300 Guam accident as a possible CFIT-caused accident.<sup>48</sup> CFIT is responsible for "claiming the lives of 2,200 people between 1988 and 1995. . . in 37 accidents."<sup>49</sup> Furthermore, 60% of the commercial airline crashes worldwide caused by CFIT were comprised of aircraft flying non-precision approaches.<sup>50</sup>

Controlled-Flight-Into-Terrain is one of the greatest causes of accidents resulting in fatalities in aviation.<sup>51</sup> CFIT is not the result of aircraft mechanical failure, and rarely is it the result of the failure of any governmental or regulatory agency. Rather, CFIT is the result of human error—allowing a well-operating aircraft to fly into terrain. Until recently, the Ground Proximity Warning System (GPWS),<sup>52</sup> which was required to be on board

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<sup>45</sup> See Peter B. Ladkin, *Controlled Flight Into Terrain: What is Being Done* (Sept. 15, 1997) <<http://www.rvs.uni-bielefeld.de/~ladkin/Reports/CFIT.html>>.

<sup>46</sup> *Id.*

<sup>47</sup> See *id.*

<sup>48</sup> See Hall, *supra* note 30.

<sup>49</sup> Ladkin, *supra* note 45.

<sup>50</sup> See Edward H. Philips, *Safety of Nonprecision Approaches Examined*, AVIATION WK. AND SPACE TECH., Aug. 18, 1997, at 23. See also David Learmount, *FSF Launches Final Assault on "Killer" CFIT Accident Rate*, FLIGHT INT'L, Nov. 20, 1996, at 15 (quoting AlliedSignal's safety expert Dan Bateman as stating that "over the last decade, for commercial jet operators worldwide, there have been an average of four CFIT crashes a year, causing between 400 and 500 fatalities.").

<sup>51</sup> See Ladkin, *supra* note 45.

<sup>52</sup> See *id.* Developed by AlliedSignal Aerospace, traditional GPWS monitors an aircraft's height above ground as determined by a radio altimeter. The GPWS computer keeps track of the radio altimeter readings and other flight information and sounds an audible warning if an undesirable trend develops. This includes situations such as: flight below specified descent angle during an

jet-powered passenger airliners by the FAA in 1976,<sup>53</sup> and the Traffic Collision Alert and Avoidance System (TCAS),<sup>54</sup> were two of the most popular avionics devices available to help combat CFIT. Because CFIT remained the most common cause of aircraft accidents, and because both GPWS and TCAS were producing false and nuisance alarms, the Enhanced Ground Proximity Warning System (EGPWS)<sup>55</sup> and CFIT Checklist<sup>56</sup> were developed.

## B. SOLUTIONS

Neither GPWS nor TCAS has been as effective as originally desired:

Both GPWS and TCAS. . . have produced variable numbers of false and nuisance alarms . . . . If a substantial fraction of the warnings received are evaluated by pilots in hindsight as false or unnecessary, they will not trust these systems, even if some of these warnings are correct and could save the aircraft.<sup>57</sup>

EGPWS, by comparison, provides a full sixty second advance warning of hazardous terrain whereas a conventional GPWS may give pilots as little as ten seconds to take action.<sup>58</sup> Additionally, unlike the conventional GPWS, EGPWS gives an illuminated panel display which is color-coded for surrounding terrain.<sup>59</sup> As further evidence of the effectiveness of EGPWS, AlliedSignal Aerospace won the Flight International Aerospace Industry Award in the Air Transport Category in 1997 for its development of EGPWS.<sup>60</sup>

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instrument approach; excessive bank angle at low altitude; excessive descent rate; insufficient terrain clearance; inadvertent descent after takeoff; and excessive closure rate to terrain.

<sup>53</sup> *See id.*

<sup>54</sup> *See id.* TCAS monitors an aircraft's position in relation to other aircraft and sounds an audible alarm if an aircraft becomes dangerously close to another aircraft.

<sup>55</sup> *See id.* EGPWS, which won FAA certification in 1996, was developed by AlliedSignal Aerospace as an improvement on AlliedSignal's current GPWS. EGPWS integrates the latest advances in navigation and terrain-database technology, together with the traditional benefits of GPWS.

<sup>56</sup> *See id.* The CFIT Checklist, developed by the Flight Safety Foundation, is a risk-assessment checklist for pilots and operators developed to reduce the risk of CFIT accidents.

<sup>57</sup> *Id.*

<sup>58</sup> *See id.*

<sup>59</sup> *See id.*

<sup>60</sup> *See* 1997 Aerospace Industry Awards Supplement, *FLIGHT INT'L*, June 18, 1997.

As a result of the CALI accident, the NTSB urged the FAA to "examine the effectiveness of the enhanced ground proximity warning equipment and, if found effective, to require all transport-category aircraft to be equipped with enhanced ground proximity warning equipment that provides pilots with an early warning of terrain."<sup>61</sup>

Subsequently, the FAA Human Factors Team has stated that:

Continued vulnerabilities to controlled-flight-into-terrain accidents demonstrate the need for further improvement in this area . . . New approaches are needed to supplement or replace the current ground proximity warning systems, such that earlier indications and warnings of potential collisions with terrain are provided and nuisance warnings are eliminated. A potential approach currently being proposed uses terrain databases in conjunction with accurate position information (*e.g.*, from the global navigation satellite system), prediction algorithms for the airplane's future flight path, graphical terrain depiction on an electronic display, and suitable flight crew alerting . . .<sup>62</sup>

The EGPWS works by comparing a digital database of the world's terrain with the aircraft's location and altitude, to generate a map-like and color coded display of surrounding terrain.<sup>63</sup> It provides a sixty second warning, which is much longer than the warning time provided by GPWS.<sup>64</sup> American Airlines and United Airlines have ordered approximately 700 and over 400 EGPWS devices respectively.<sup>65</sup>

In addition to AlliedSignal's development of EGPWS to combat CFIT accidents, the Flight Safety Foundation created a CFIT Committee in 1993.<sup>66</sup> The Flight Safety Foundation has led a worldwide industry task force, including more than 120 organizations, to reduce CFIT.<sup>67</sup> As previously mentioned, the Flight

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<sup>61</sup> See Peter B. Ladkin, *Computer-Related Incidents with Commercial Aircraft: The American Airlines B757 Accident in Cali* (May 5, 1998) <<http://www.rvs.unibielefeld.de/~ladkin/Incidents/FBW.html>>.

<sup>62</sup> U.S. Department of Transportation, Federal Aviation Administration Human Factors Team, *The Interfaces Between Flight crews and Modern Flight Deck Systems* (June 18, 1996) <<http://www.faa.gov/avr/afs/interfac.pdf>>.

<sup>63</sup> See Learmount, *supra* note 50.

<sup>64</sup> See *id.*

<sup>65</sup> See Paul Proctor, *Major Airlines Embrace Enhanced GPWS*, AVIATION WK. AND SPACE TECH., Apr. 21, 1997, at 46.

<sup>66</sup> See Ladkin, *supra* note 45.

<sup>67</sup> See Stuart Matthews, *Proposals for Improving Aviation Safety and Changing the System*, Remarks to the White House Commission on Aviation Safety and Security International Conference on Aviation Safety and Security in the Twenty-first Cen-

Safety Foundation developed a CFIT Checklist,<sup>68</sup> a risk-assessment checklist for pilots and operators.

Given that CFIT is one of the greatest causes of accidents resulting in fatalities in commercial aviation and is largely the result of human error, if all pilots and operators are equipped with EGPWS, use the CFIT Checklist, and are trained in CFIT prevention, CFIT can be dramatically reduced, if not eliminated.

#### IV. PILOT TRAINING

##### A. PROBLEMS

The White House Commission on Aviation Safety and Security has recommended that government and industry aviation safety research should emphasize human factors and training.<sup>69</sup> In fact, approximately 70% of the aircraft accidents which occurred during the past forty years have been attributed to pilot error.<sup>70</sup> While the higher quality of pilot training has decreased the number of accidents during this period even as air traffic has increased, pilot training is still a serious concern.<sup>71</sup> Jim Burnett, former Chairman of the NTSB, has stated that the way to further cut accident rates by up to 80% is through increased pilot training.<sup>72</sup> Human factors continue to be the leading cause

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tury (Jan. 13, 1997)(transcript available at <<http://www.gwu.edu/~cms/aviation>>).

<sup>68</sup> See Ladkin, *supra* note 45.

<sup>69</sup> See Vice President Al Gore, THE WHITE HOUSE COMMISSION ON AVIATION SAFETY AND SECURITY FINAL REPORT TO PRESIDENT CLINTON (Feb. 12, 1997) (transcript available at <<http://www.aviationcommission.dot.gov/212fin~1.html>>).

<sup>70</sup> Interview with Joseph Vincent Montone, FAA Designated Examiner, and Part 121 Check Airmen and Instructor, (Mar. 25, 1998). See also Hall, *supra* note 30 (stating that inappropriate control inputs applied by the flying pilot-in-command, the failure of the non-flying pilot-in-command to recognize, address, and correct inappropriate control inputs, and the failure of Airborne Express to establish a formal, functional evaluation flight program were the probable causes of the accident of a DC-8-63 which impacted mountainous terrain in the vicinity of Narrows, Virginia, on December 22, 1996; and that failure of the pilots in the King Air A90 to effectively monitor the common traffic advisory radio frequency or to properly scan for traffic was the probable cause of the accident on November 19, 1996 involving United Express Flight 5925, a Beech 1900C, which collided with a Beech King Air A90 at Quincy Municipal Airport near Quincy Illinois).

<sup>71</sup> See *id.*; see also Michael D. Fanfalone, Nat'l Pres. of Prof'l Airways Sys. Specialists (PASS), Remarks before the House Appropriations Subcommittee on Transportation and Related Agencies (Feb. 3, 1998) (transcript available at 1998 WL 44744 (F.D.C.H.)).

<sup>72</sup> See Burnett, *supra* note 34.

of aircraft accidents, according to National Transportation Safety Board Chairman, Jim Hall.<sup>73</sup> A Boeing analysis found that flight crew errors were the most common cause of all worldwide commercial jet accidents over the last ten years.<sup>74</sup> This evidence supports the need for better flight crew training.<sup>75</sup> The needed training in this area should focus on improving the collective performance of the flight deck crew rather than the individual flying skills and performance of its members.<sup>76</sup>

## B. SOLUTIONS

A key objective in the aviation industry today is achieving a zero accident rate.<sup>77</sup> One way of achieving this goal is the development of a higher quality of captain and first officer training.<sup>78</sup> Crew Resource Management, programs in which pilots are trained to improve communication techniques among themselves and to coordinate tasks in particular situations,<sup>79</sup> and CFIT training are two vehicles that help to educate crews in the area of technical and non-technical training, both of which are essential to the growth, development, and safety of a flight operation.<sup>80</sup> This training should be expanded throughout the industry.<sup>81</sup> In addition, all pilots should be trained with a "Captain's Mindset," a philosophy that conveys the message to all first officers that they must think, act, and respond like a captain.<sup>82</sup> In flight operations throughout the world the co-pilot or first officer is sometimes viewed as a second class citizen—a per-

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<sup>73</sup> See Interview with James Hall, Chairman of National Transportation Safety Board (Feb. 11, 1998).

<sup>74</sup> See Brent E. Dyer, *Risk Management and Its Application to Air Carrier Safety*, 62 J. AIR L. & COM. 491, 501 (1996) (quoting Robert G. Knowles, *Airline-Crash Prevention Seen as Needed*, NAT'L UNDERWRITER, PROP. & CASUALTY - RISK & BENEFITS MGMT., Nov. 28, 1994, at 21); see also Norman Y. Mineta, Chair, National Civil Aviation Review Commission Report, *Avoiding Aviation Gridlock and Reducing the Accident Rate - A Consensus for Change* (Dec. 11, 1997) (transcript available at <<http://www.faa.gov/ncarc/reports/pepele.htm>>).

<sup>75</sup> See Mineta, *supra* note 74.

<sup>76</sup> See Montone, *supra* note 70.

<sup>77</sup> See *id.*

<sup>78</sup> See *id.*

<sup>79</sup> See Ladkin, *supra* note 45.

<sup>80</sup> See *id.*

<sup>81</sup> John H. Anderson, Remarks before the Subcommittee on Transportation, Committee on Appropriations, House of Representatives (Feb. 12, 1998) (transcript available at 1998 WL 61442 (F.D.C.H.)).

<sup>82</sup> Montone, *supra* note 47.



ception which must be changed.<sup>83</sup> Several aircraft accident case studies have revealed that the co-pilot attempted to question the captain on a procedure or clearance once or twice; however, as a result of the co-pilot's junior status, the co-pilot was not able to change the captain's mind and often was not even able to focus the captain's attention on the problem.<sup>84</sup> Thus, training co-pilots to have a "Captain's Mindset" is imperative to achieving a zero accident rate.<sup>85</sup>

When faced with a problem, a first officer trained with a "Captain's Mindset" will offer a solution to the captain instead of looking to him or her for the answer.<sup>86</sup> Such a first officer would take responsibility for his or her aircraft, crew, and passengers, and would be trained to establish excellent habits in order to be more of an asset in the cockpit as well as in the cabin.<sup>87</sup> A first officer with a "Captain's Mindset" should be trained and checked according to Airline Transport Pilot standards, establishing a single-standard level of safety in the industry.<sup>88</sup> Such training will result in greater efficiency in pilot training, a higher level of commitment from all flight departments, and greater pilot accountability, thus significantly increasing aviation safety.<sup>89</sup>

It is difficult to put a price on the overall cost of an aircraft accident or to estimate the true value of high quality pilot training. A single accident may shut down a company or, more tragically, result in significant loss of life.<sup>90</sup> Many individuals and/or corporations may view pilot training as a financial liability until an accident occurs which highlights the need to emphasize pilot training.<sup>91</sup> The entire aviation industry should be responsible for educating corporate America on the value of high quality pilot training—before, not after, accidents occur.<sup>92</sup>

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<sup>83</sup> *See id.*

<sup>84</sup> *See id.*

<sup>85</sup> *See id.*

<sup>86</sup> *See id.*

<sup>87</sup> *See id.*

<sup>88</sup> *See id.*

<sup>89</sup> *See id.*

<sup>90</sup> *See id.*

<sup>91</sup> *See id.*

<sup>92</sup> *See id.*

## V. LANGUAGE BARRIERS

### A. PROBLEMS

Lack of English language proficiency among air traffic controllers and pilots has plagued the aviation industry around the world for the past twenty years.<sup>93</sup> In fact, investigators have cited the inability of air traffic controllers and pilots to speak and understand English (the industry's recognized common language), as the cause of the following air disasters:

- In 1977, at Tenerife in the Canary Islands, heavy accents and improper terminology among a Dutch KLM crew, an American Pan Am crew and a Spanish air traffic controller led to the worst aviation disaster in history, in which 583 passengers perished.
- In 1980, another Spanish air traffic controller at Tenerife gave a holding pattern clearance to a Dan Air flight by saying "turn to the left" when he should have said "turns to the left", resulting in the aircraft making a single left turn rather than making circles using left turns. The jet hit a mountain killing 146 people.
- In 1990, Colombian Avianca pilots in a holding pattern over Kennedy Airport told controllers that their 707 was low on fuel. The crew should have stated that they had a "fuel emergency," which would have given them immediate clearance to land. Instead, the crew declared a "minimum fuel" condition. The plane ran out of fuel, crashing and killing 72 people.
- In 1993, Chinese pilots flying a U.S.-made MD-80 were attempting to land in northwest China. The pilots were baffled by an audio alarm from the plane's ground proximity warning system. A cockpit recorder picked up the pilot's last words: "What does 'pull up' mean?"
- In 1995, an American Airlines jet crashed into a mountain in Colombia after the captain instructed the autopilot to steer towards the wrong beacon. A controller later stated that he suspected from the pilot's communications that the jet was in trouble, but that the controller's English was not sufficient for him to understand and articulate the problem.

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<sup>93</sup> See, e.g., Matthew L. Wald, *Language Gap Plays Role in Hundreds of Air Deaths*, N. Y. TIMES, Dec. 9, 1996, at B10; John Ritter, *Cleared For Disaster: Poor Fluency in English Means Mixed Signals*, USA TODAY, Jan. 18, 1996, at 1A.

- On November 13, 1996, a Saudi Arabian airliner and a Kazakhstan plane collided in mid-air near New Delhi, India. While an investigation is still pending, early indications are that the Kazak pilot may not have been sufficiently fluent in English and was consequently unable to understand an Indian controller giving instructions in English.<sup>94</sup>

## B. SOLUTIONS

English is, unofficially, the international language of aviation.<sup>95</sup> Every pilot who flies internationally must have command of at least 500 English words.<sup>96</sup> This standard is aimed at teaching pilots the bare minimum that is required for understanding basic aviation terminology.<sup>97</sup> In addition, in the United States, FAA regulations mandate that a foreign carrier wishing to operate in U.S. airspace must certify that its pilots can speak and understand English well enough to communicate with controllers.<sup>98</sup>

It seems clear that the English standards currently in effect in the United States and worldwide are dangerously insufficient. In addition, the FAA has done very little to alleviate the problem. The FAA was supposed to urge the International Civil Aviation Organization (ICAO) to support a spoken English test for pilots and controllers.<sup>99</sup> Instead, the FAA asked ICAO to cooperate with an industry group on a new glossary of international aviation terms.<sup>100</sup> Some 180 nations have adopted these terms, but they are nevertheless free to deviate from them.<sup>101</sup> In fact, the FAA's mandatory wording differs from ICAO's in dozens of instances.<sup>102</sup>

What is needed, both in the U.S. and worldwide, is a mandatory spoken English test for pilots and controllers. Such a test should not place an unreasonably high burden on the aviation industry in general. Many countries are voluntarily moving to an English-only aviation communication system. For

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<sup>94</sup> See John F. Burns, *Indian and Kazak Officials Trade Accusations in Air Collision*, N. Y. TIMES, Nov. 15, 1996, at A11.

<sup>95</sup> See *Indian Air Disaster Raises Concerns About ATC Communications*, CNS OUTLOOK, Nov. 13, 1996, available in 1996 WL 8539760.

<sup>96</sup> See *id.*

<sup>97</sup> See *id.*

<sup>98</sup> See Ritter, *supra* note 93.

<sup>99</sup> See *id.*

<sup>100</sup> See *id.*

<sup>101</sup> See *id.*

<sup>102</sup> See *id.*

instance, this year all controllers and pilots in China are required to speak English to one another in all sectors of international traffic.<sup>103</sup> Furthermore, several higher learning institutions, such as Embry-Riddle and the Center for Aerospace Science at the University of North Dakota, have been teaching English to foreign controllers for many years. This program would be particularly useful for more widespread training should a mandatory spoken English test become a reality.<sup>104</sup>

## VI. THE AIR TRAFFIC CONTROL SYSTEM, AIR TRAFFIC CONTROLLERS AND THE YEAR 2000 ISSUE

### A. PROBLEMS - AIR TRAFFIC CONTROL SYSTEM AND AIR TRAFFIC CONTROLLERS

The Air Traffic Control System (ATCS) in effect today is largely the by-product of several catastrophic aviation accidents that occurred during the late 1950s and early 1960s.<sup>105</sup> The two most significant accidents occurred in 1956 and 1960.<sup>106</sup> In 1956, a midair collision over the Grand Canyon led to the use of primary, or search radar, to locate and to track the aircraft monitored by controllers.<sup>107</sup> In 1960, a midair collision over New York City led to the use of secondary, or beacon radar, thus giving air traffic controllers the individual identity and altitude of each aircraft under their supervision.<sup>108</sup> Today, the overall management of air traffic in the United States relies heavily on the use of both primary and secondary radar, instantaneous voice communications between pilots and air traffic controllers, and ground-based automation at various ATMS facilities.<sup>109</sup>

The FAA currently manages the nation's civilian ATCS.<sup>110</sup> Nearly 41% of the FAA's annual budget of \$8.4 billion, and three-quarters of its 49,000 employees, are involved with ATCS.<sup>111</sup> This system encompasses airport control towers, which

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<sup>103</sup> See Matthew L. Wald, *China Sends Controllers to U.S. To Improve English Proficiency*, THE N. Y. TIMES, Dec. 9, 1996, at A1.

<sup>104</sup> See *id.*

<sup>105</sup> See John A. Scardina, et al. *ATM: The Only Constant is Change*, AEROSPACE AM, Mar. 1996, at 20.

<sup>106</sup> See *id.*

<sup>107</sup> See *id.*

<sup>108</sup> See *id.*

<sup>109</sup> See Kelly, *supra* note 23.

<sup>110</sup> See *id.*

<sup>111</sup> See Faye Bowers, *FAA Looks For Ways to Free More Resources For Air Safety*, CHRISTIAN SCI. MONITOR, July 9, 1996, at 3. Cf. Douglas B. Feaver, *A New Route to Safety; The Airline Industry Has Changed: So Must the FAA*, WASH. POST, Aug. 4, 1996, at C1

guide and separate aircraft through landings, takeoffs, and taxiing; and twenty air traffic management centers, which manage the flow of air traffic between airports within the system.<sup>112</sup> The system hardware, however, is chronically antiquated and in its current form will be unable to safely accommodate the country's steadily rising volume of air traffic.<sup>113</sup>

Controllers are charged with a most important mandate — they protect the lives of millions of air-passengers each day. Ironically, they are forced to work with antiquated vacuum-tubed computers, typically dating back to the 1960s and having only one percent of the power of a modern desktop PC.<sup>114</sup> Of the twenty-one Air Route Traffic Control Centers in the contiguous United States, five operate IBM 9020E computers that are more than thirty years old, and fifteen operate Raytheon 750 computers that are approximately twenty-five years old.<sup>115</sup> Stress rates among controllers continue to skyrocket, while mental breakdown on the jobsite has been documented.<sup>116</sup> Overtime, long hours, and extraordinary pressures have contributed to a three-fold increase in near mid-air collisions over New York City alone.<sup>117</sup>

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(putting the cost of ATMS at 70% of the FAA's budget or roughly \$6.3 billion out of a total budget of \$9 billion).

<sup>112</sup> See Scardina, *supra* note 105.

<sup>113</sup> See, e.g., Jonathan Freeland, *Collision Course: Deregulation Means World Aviation is in for a Bumpy Ride, Crashes and Terror*, MONTREAL GAZETTE, May 22, 1996, at B3 (stating that ATCS is plagued by "dodgy equipment"); Editorial, *Safety and Airline Cost Cutting*, TAMPA TRIB., July 10, 1996, at 8, available in 1996 WL 10876570 (stating that air traffic controllers complain of "antiquated, inadequate radar equipment"); Darcy Frey, *Something's Got to Give*, N. Y. TIMES, Mar. 24, 1996, at 42 (quoting an air traffic controller "If the FAA doesn't fix this goddamned equipment, it's only a matter of time before there's a catastrophe."); Katherine T. Beddingfield, et al., *A Flier's Q&A on Safety*, U.S. NEWS & WORLD REP., May 27, 1996, at 38, available in 1996 WL 7810768 (stating that air traffic control computers are "antiquated").

<sup>114</sup> See *id.*

<sup>115</sup> See National Transportation Safety Board Press Release, Jan. 23, 1996.

<sup>116</sup> See Darcy Frey, *supra* note 113 (recounting one controller's breakdown when he lost ten jets on his radar screen over Newark during final approach and, consequently, began ripping off his clothes and quivering on the floor).

<sup>117</sup> See *id.*

## B. SOLUTIONS - AIR TRAFFIC CONTROL SYSTEM AND AIR TRAFFIC CONTROLLERS

### 1. ATCS Privatization

Several industry-related groups have recently proposed privatizing ATCS.<sup>118</sup> The obvious benefit of privatization would be to transfer the costs currently borne by the government into private hands.<sup>119</sup> Proponents of privatization also claim that it would make the skies safer. These groups reason that the FAA frequently requires major capital expenditures to keep its radar and communications equipment state of the art.<sup>120</sup> But as a government agency, the FAA has not been able to get the capital it needs for ATCS quickly enough.<sup>121</sup> Consequently, ATCS equipment remains chronically antiquated.<sup>122</sup> An ATCS corporation, on the other hand, would be able to raise the required resources by tapping into capital markets, thus insuring that it has state of the art equipment.<sup>123</sup>

Additionally, proponents say a move towards ATCS privatization would also relieve the overburdened FAA from all aspects of air traffic control, except for oversight and regulation of the private enterprise that assumes responsibility for the ATCS. Such a new structure would enable a leaner governmental FAA to devote substantially more of its resources exclusively to airline

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<sup>118</sup> See Feaver, *supra* note 111 (commenting that President Clinton proposed the change two years ago but his administration has not pursued the matter in spite of support from industry and FAA observers).

<sup>119</sup> See Robert W. Poole Jr., *For Safer Skies, Let's Corporatize*, WASH. TIMES, Oct. 31, 1994, at 18 (stating that privatization would save travelers and airlines time worth up to \$1.5 billion a year and save taxpayers \$18 billion during the next decade).

<sup>120</sup> See Bowers, *supra* note 111 (noting that ATCS is highly capital intensive and that expensive equipment must be replaced every 15 years to keep pace with technology).

<sup>121</sup> See Poole, *supra* note 119 (stating that the government's costly and time-consuming procurement regulations make modernizing ATCS difficult and virtually guarantee that the ATCS will remain one or two generations behind); see also *FAA Reform: It's Time to Split Promotion from Safety*, DALLAS MORNING NEWS, June 28, 1996, at 26A, available in 1996 WL 2132800 (commenting that a House bill makes good sense, since it would liberate the FAA from the Department of Transportation's cumbersome procurement procedures).

<sup>122</sup> See *id.*

<sup>123</sup> See *Air Traffic Control: Clinton Urges Congress to Pass ATC Privatization Legislation*, AIR SAFETY WK., May 15, 1995, available in 1995 WL 6704178 (quoting President Clinton as stating that the ATCS corporation "would quickly modernize the nation's control towers, and would keep them up-to-date and properly staffed. Even as traffic increases in years to come, the corporation would keep American skies the safest in the world.").

safety regulation.<sup>124</sup> Privatization would allow the FAA to “work smarter” by using risk assessment to decide the carrier inspection targets and methods, manner, and degree of ATCS monitoring.<sup>125</sup>

Certain commentators believe that the FAA must update its management techniques, improve its staff, and modernize its culture in order to deal more effectively with its supervisory functions and the problems which will result from the enormous increase expected in air traffic in the coming years. They feel that the FAA has been reluctant to abandon its “old boy network” of former military and civil service personnel and must make a concerted effort to hire a better educated and younger group of professionals to fulfill its mandate.<sup>126</sup> Relieving the FAA from the primary responsibility for air traffic control might have the effect of enabling it to focus its attention on this and other matters necessary to deal with current and future oversight and regulatory needs. In addition, private enterprise may also be more amenable than the FAA to hiring air traffic controllers who are graduates of the FAA-sponsored College Training Initiative. Even though the FAA sponsored this program, it has not yet resulted in the hiring of significant numbers of these graduates.

The first step in privatizing ATCS would be to reorganize the FAA and create a new independent corporation.<sup>127</sup> Next, substantially all ATCS-related FAA employees (roughly 40,000), all FAA facilities equipment used to operate ATCS, and all ATC responsibilities held by the FAA (other than oversight and regulation) would be transferred to this new corporation.<sup>128</sup> During the reorganization period, and until the company becomes fully operational, all shares could be held by the United States. As part of the reorganization, it is also possible that new ATCS companies could be created to foster competition.<sup>129</sup> At the end of any reorganization period, the shares would finally be sold to

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<sup>124</sup> See Bowers, *supra* note 111 (quoting an airline consultant as stating that under ATCS privatization FAA “regulators would have more time in regulating safety.”).

<sup>125</sup> See *id.*

<sup>126</sup> Interview with Gary Kitley, Executive Director of the Council on Aviation Accreditation (Feb. 19, 1998).

<sup>127</sup> See Ronald D. Utt & Wendell Cox, *How to Close Down the Department of Transportation*, HERITAGE FOUND. REP., Aug. 17, 1995.

<sup>128</sup> See *id.*

<sup>129</sup> See *id.*

the public,<sup>130</sup> or to one or more existing public or privately held corporations. A portion of the shares might also be reserved for purchase by firms and industries that would depend on the corporation's services, such as major airlines or associations representing general aviation or passengers.<sup>131</sup> Once the corporation is established, it would operate on a self-supporting basis and should have the same authority to borrow from capital markets for major expenditures, modernization, and various other improvements as any other company.<sup>132</sup>

Many countries have either already privatized their ATCS or have legislation pending which would result in privatization.<sup>133</sup> For example, New Zealand has enjoyed success with the new structure. Modernizing its ATCS for less than one half the cost the government predicted, it persuaded private aircraft users to pay user charges, reduced its operating costs, and returned handsome profits.<sup>134</sup>

Those who oppose privatization (including some members of The Association of the Bar of the City of New York's Aeronautics Committee) make several persuasive arguments. Some worry that a private corporation would actually hamper any effort to improve safety, since such a corporation would be motivated predominately by a desire for profits.<sup>135</sup> Others contend that public accountability and Congressional oversight would be lost.<sup>136</sup> Labor groups are concerned about the potential labor-management problems which might result from a privatized system.<sup>137</sup> Phil Boyer, President of the Aircraft Owners and Pilots

<sup>130</sup> See *id.*

<sup>131</sup> See *id.*

<sup>132</sup> See *id.*

<sup>133</sup> See Poole, *supra* note 119 (noting that, in 1992, Germany and South Africa enacted privatization laws, Switzerland revised its privatization model along New Zealand lines, Canada's airlines petitioned Transport Canada to convert to the New Zealand model, and Britain went a step further by announcing that it would sell its already corporatized ATCS to private investors).

<sup>134</sup> See *id.*

<sup>135</sup> See *id.* (quoting House Aviation Subcommittee Chairman James Oberstar: "I do not believe that moving the ATC system further away from government control is the best way to ensure safety."); see also Joseph J. Trombino, *Don't Privatize Air-Traffic Control*, VIRGINIAN PILOT, Aug. 17, 1995, at A14 (stating that public safety should not be in the hands of a corporation driven by profit).

<sup>136</sup> See *Pilots Group Against Air Traffic Control Corporation, Offers Congress Five-Point Plan For FAA Reform*, PR NEWSWIRE, Feb. 14, 1995 (questioning how key public policy matters could be settled by a corporate board of directors which would heavily influenced by the major airlines).

<sup>137</sup> See *id.* (raising the possibility of a \$2 billion pension liability due upon the transfer of FAA employees to the private corporation).



Association, posits that privatization is not a solution to this non-problem. He believes that moving ATCS out of the government into a private company creates no competitive advantage. The private company will be a monopoly subject to union and large corporate pressures, but without any countervailing public benefit. Other opponents also maintain that already privatized air traffic control agencies in other countries are so small by comparison to the FAA as to make comparison meaningless. Finally, additional questions would arise in connection with liability or responsibility for air traffic accidents.<sup>138</sup>

## 2. *Liberating the Federal Aviation Administration*

Although privatization has not been acted upon in any meaningful way in Washington, a bill recently passed by the House of Representatives, while not privatizing ATCS, would combat the funds procurement problem. The bill would largely free the FAA from the Department of Transportation (DOT) and its myriad of procurement procedures, regulations, reviews, and "bottomless pit of second guessers," giving air traffic controllers faster access to the best technology and improving the efficiency and profitability of U.S. airlines.<sup>139</sup> Under the House Bill, the Secretaries of Transportation and Defense would sit on the reformed FAA's board as nonvoting members. A Senate Bill, on the other hand, would also combat the funds procurement problem but would leave the FAA within the DOT. Former Transportation Secretary Frederico PeZa supported such a bill and threatened to ask President Clinton to veto any bill that strips the FAA away from the DOT.<sup>140</sup> This type of bill might also enable the FAA to hire more of the better educated, recently graduated College Training Initiative students as air traffic controllers.

## 3. *"Free-Flight"*

Another proposal currently receiving a lot of attention, known as "Free Flight," is endorsed by most industry groups including the FAA.<sup>141</sup> Free Flight, a joint initiative between the

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<sup>138</sup> See Boyer, *supra* note 26.

<sup>139</sup> Feaver, *supra* note 111; see also *FAA Reform: It's Time to Split Promotion from Safety*, DALLAS MORNING NEWS, June 28, 1996, at 26A available in 1996 WL 2132800.

<sup>140</sup> See *id.*

<sup>141</sup> Telephone Interview with Arlene Feldman, FAA Regional Administrator (Mar. 24, 1998).

FAA and the global aviation industry,<sup>142</sup> is a satellite and computer based navigation system.<sup>143</sup> Using this system, pilots, rather than air traffic controllers, would be able to select their own routes utilizing a Global Positioning System, a satellite network that pinpoints an aircraft's position with great accuracy.<sup>144</sup> The system is so advanced that pilots could even pick the routes having the most favorable wind conditions and least traffic.<sup>145</sup>

Free Flight is based on the principle of maintaining safe aircraft separation.<sup>146</sup> The system defines two zones: a protected zone and an alert zone.<sup>147</sup> The size of each zone depends on the aircraft's speed and performance characteristics as well as its communication, navigation, and surveillance equipment.<sup>148</sup> The protected zone is the one closest to the aircraft. The protected zone of one aircraft can never meet the protected zone of another.<sup>149</sup> The alert zone is much larger than the protected zone. Aircraft can move freely until two alert zones come into contact.<sup>150</sup> If two alert zones come into contact, a controller would send course corrections or restrictions to ensure separation.<sup>151</sup>

The potential benefits of Free Flight are enormous. The system would promote safety by allowing aircraft to travel with virtually no assistance from overburdened air traffic controllers and by providing more accurate information from satellites.<sup>152</sup> It is estimated that Free Flight will save domestic airlines as much as \$5 billion per year by the year 2010.<sup>153</sup> Free Flight could also shorten the duration of some flights by as much as

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<sup>142</sup> See *id.*; see also Federal Aviation Administration, *Free Flight: An Introduction*, (visited Feb. 3, 1999) <<http://www.faa.gov/asd>> [hereinafter *Free Flight*].

<sup>143</sup> See Tom Curley, *Airlines Hope 'Free Flight' Will Fly*, USA TODAY, Mar. 18, 1996, at 3A.

<sup>144</sup> See *id.*

<sup>145</sup> See *id.*

<sup>146</sup> See *Free Flight*, *supra* note 142.

<sup>147</sup> See *id.*

<sup>148</sup> See *id.*

<sup>149</sup> See *id.*

<sup>150</sup> See *id.*

<sup>151</sup> See *id.*

<sup>152</sup> See *id.* Under Free Flight, air traffic controllers would be relegated to providing only minimal assistance when aircraft enter heavily trafficked airports and cities.

<sup>153</sup> See David Hinson, then-FAA Administrator, Remarks at The Coalition for Clean Air Annual Luncheon, Los Angeles, California, (March 21, 1996) (transcript available at <<http://www.faa.gov/apa/speeches/aoa/fso3air.htm>>).

20%.<sup>154</sup> In fact, the FAA views Free Flight as a necessary concept if the FAA is to handle the anticipated increase in air travel over the next twenty years.<sup>155</sup> In order to implement Free Flight, the FAA is currently evaluating and acquiring new technologies, such as a standard terminal automation and replacement system, a global positioning system, a wide area augmentation system, a traffic alert and collision avoidance system, as well as digital communications and dependent cooperative surveillance. Additionally, it is evaluating decision support systems including final approach spacing, enhanced traffic flow management, conflict probe/resolution, and surface management advisors.

Recently, the FAA developed Flight 2000 Path to Free Flight (FLIGHT 2000).<sup>156</sup> FLIGHT 2000 is a microcosm of and precursor to Free Flight.<sup>157</sup> FLIGHT 2000 will transfer the Free Flight concept to a real operational setting and conduct a complete operational system evaluation prior to NAS-wide development.<sup>158</sup> At the center of FLIGHT 2000 is the integration of information via digital communications, navigation satellites, automatic dependent surveillance broadcasts, weather processors, cockpit displays, and air traffic control and flight planning tools for the safe planning and efficient execution of all phases of flight.<sup>159</sup> Flight 2000's operational capabilities are scheduled to begin in the year 2001 in Alaska, Hawaii, and the Pacific Ocean airspace.<sup>160</sup>

Although the potential benefits of Free Flight may be desirable, such a free-flowing air traffic control system may compromise safety. Particularly in congested air traffic areas such as the New York metropolitan area, increased air traffic control and separation — not decreased control and separation as proposed through implementation of Free Flight — may be necessary to ensure the safety of aircraft flight. Additionally, Free Flight cannot be implemented immediately. Full implementation would require new ground and air-based communications, navigation,

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<sup>154</sup> See *id.*

<sup>155</sup> See David Hinson, then-FAA Administrator, Remarks at The Aero Club of Southern California (March 22, 1996)(transcript available at <<http://www.faa.gov/apa/speeches/aoa/aero322.htm>>).

<sup>156</sup> See Federal Aviation Administration, *Flight 2000 Overview* (visited Feb. 3, 1999) <<http://www.faa.gov/flight2000/index.htm>>.

<sup>157</sup> See *id.*

<sup>158</sup> See *id.*

<sup>159</sup> See *id.*

<sup>160</sup> See *id.*

and surveillance equipment, as well as new avionics and decision support systems.<sup>161</sup> Since the system hinges upon the introduction of sophisticated, high-tech satellite and computer tracking technology, it is estimated that it will take at least ten years to develop and implement and that it will cost billions of dollars.<sup>162</sup>

### C. PROBLEMS - THE YEAR 2000 ISSUE

At 12:00 a.m. on January 1, 2000, many computer systems worldwide will malfunction or produce incorrect information because of a simple date-change anomaly.<sup>163</sup> The Year 2000 (Y2K) Problem, as it is called, results from the way computer systems store and manipulate dates.<sup>164</sup> Dates are often used as part of a computer-based system's algorithm or decision process.<sup>165</sup> For efficiency in storage space, most computer manufacturers and computer-program designers omitted the first two digits for the year (i.e., the century) when they referred to dates in computer programs.<sup>166</sup> Therefore, when the date rolls over from 1999 (99) to 2000 (00), many computer programs will fail to recognize the change in the century and misread "00" (the year 2000) as 1900 instead.<sup>167</sup>

As the year 2000 approaches, the date rollover problems associated with various computer systems become more apparent.<sup>168</sup> These problems include: 1) the malfunctioning of sort routines; 2) the reversal of logic decisions; 3) the inability to forecast shelf-life items; 4) the inability of inventory systems to generate correct stock level reports for reordering; 5) the malfunctioning of commercial products; 6) the invasion of security access rules; and 7) the inability to validate intelligence data properly.<sup>169</sup>

The types of systems that will be affected include mainframes, client/servers, networks, workstations, telecommunications systems, radar processors, and communication processors.<sup>170</sup> Software that is potentially affected includes both application

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<sup>161</sup> See *Free Flight*, *supra* note 142.

<sup>162</sup> See *id.*

<sup>163</sup> See Federal Aviation Administration, Official Internet Site, *Year 2000 Program*, <<http://www.faa2k.com>>.

<sup>164</sup> See *id.*

<sup>165</sup> See *id.*

<sup>166</sup> See *id.*

<sup>167</sup> See *id.*

<sup>168</sup> See *id.*

<sup>169</sup> See *id.*

<sup>170</sup> See *id.*

software and system software.<sup>171</sup> Databases and fields which store two position year fields will also be affected.<sup>172</sup>

Although the Y2K problem is not a difficult technical problem to solve, it requires a major coordination effort throughout the FAA due to the large number of computer systems, languages, and platforms used by the FAA.<sup>173</sup> Many of the FAA's systems are classified as Mission Critical, such as the majority of those that comprise the National Aerospace System (NAS).<sup>174</sup> Several Mission Critical systems are affected by the Y2K issue, and require renovation to become Year 2000 compliant.<sup>175</sup> Fortunately, those repairs are well underway and many systems have already been renovated and certified compliant.<sup>176</sup>

#### D. SOLUTIONS—THE YEAR 2000 ISSUE

Safety is the single most important concern at the FAA. The overall goal of the FAA Y2K Program Office (Y2K PO) is to insure that the NAS operates safely through the Y2K and beyond.<sup>177</sup> The FAA is now Y2K compliant, but it took several steps to achieve this goal: 1) the establishment of a schedule that required all FAA systems (including the NAS) to be Y2K compliant by June 30, 1999; 2) the development of Y2K contingency plans for each FAA system to augment existing operational contingency plans for the NAS detailing alternate courses of action in the event of system outages due to Y2K; and 3) the development of an agency level Y2K contingency plan.<sup>178</sup>

In order to coordinate all Y2K compliance efforts throughout the FAA, the Y2K PO developed four major goals: 1) to insure that the NAS and other core FAA systems will operate reliably through the Y2K and beyond; 2) to insure that all lines of business across the FAA follow a consistent approach and adhere to the project schedule; 3) to monitor the status of all FAA Y2K efforts through the entire repair life cycle; and 4) to minimize risks associated with the FAA Y2K repair efforts.<sup>179</sup>

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<sup>171</sup> *See id.*

<sup>172</sup> *See id.*

<sup>173</sup> *See id.*

<sup>174</sup> *See id.*

<sup>175</sup> *See id.*

<sup>176</sup> *See id.*

<sup>177</sup> *See id.*

<sup>178</sup> *See id.*

<sup>179</sup> *See id.*

One of the Y2K PO's first steps toward these goals was to establish Y2K Line of Business (LOB) Program Offices (LOB Y2K PO) for each of the FAA's seven lines of business.<sup>180</sup> Each LOB Y2K PO is responsible for the Y2K repair activities associated with all systems in its LOB.<sup>181</sup> The FAA Y2K PO is responsible for ensuring that LOB Y2K compliance efforts are carried out effectively.<sup>182</sup> More specifically, the FAA Y2K PO does the following: 1) establishes and maintains a structure, process, and schedule for the Y2K repair efforts across the FAA; 2) monitors and reports status for FAA Y2K activities; 3) helps coordinate conversion of cross boundary information systems; 4) establishes a method for ranking systems by critical and conversion priority; 5) minimizes and manages risk associated with the Y2K; 6) manages resource allocation; 7) maintains clear lines of communication with all involved parties; and 8) facilitates the exchange of information between LOB Y2K PO's, preventing duplication of efforts.<sup>183</sup> Each LOB Y2K PO does the following: 1) oversees Y2K repair efforts throughout the LOB; 2) maintains a management structure conducive to this role; 3) insures that systems and owners are adhering to the FAA Y2K repair process and standards; 4) provides the LOB specific technical support to systems owners and renovators in the field; 5) mobilizes resources within the LOB; 6) coordinates with appropriate managers in the FAA Y2K PO regarding agency-wide standards; 7) works closely with FAA Y2K PO to bring any necessary expertise to the LOB; and 8) reports progress of Y2K repairs to the FAA Y2K PO.<sup>184</sup>

The Y2K issue continues to be a concern. Given that the Year 2000 is less than one year away, in order to maintain safe air travel we must insure that the necessary renovations made to key FAA operations systems, including radar and communications systems that control air traffic, are effective at maintaining such systems as Y2K compliant. Otherwise, at 12:00 a.m. on January 1, 2000, the safe control of air traffic may be compromised.

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<sup>180</sup> *See id.*

<sup>181</sup> *See id.*

<sup>182</sup> *See id.*

<sup>183</sup> *See id.*

<sup>184</sup> *See id.*

## VII. AIRCRAFT PARTS: "BOGUS" OR "UNAPPROVED"

## A. PROBLEMS

## 1. Background

Another major aviation safety problem involves the use of "bogus" or "unapproved" parts.<sup>185</sup> Everyone, including the FAA, acknowledges that parts which have not been formally approved by the FAA find their way into airplanes flying throughout the United States.<sup>186</sup> Parts are classified into two distinct categories by the FAA.<sup>187</sup> The category "unapproved" parts refers to those parts which are airworthy but simply lack the proper FAA paperwork.<sup>188</sup> The other category, referred to as "bogus" parts, includes counterfeit parts, parts which are inadequately refurbished, and parts which are simply not functional.<sup>189</sup> All experts agree that the latter group of parts poses the greatest danger to the flying public.<sup>190</sup>

The FAA, however, appears to be reluctant to acknowledge bogus parts as a cause of accidents.<sup>191</sup> Mary Schiavo, the outspoken former Inspector General of the Transportation Department, has asserted that the FAA pressured her and the NTSB to replace the use of the term "bogus" parts with that of the less ominous sounding "unapproved" parts terminology.<sup>192</sup> She has also claimed that the FAA has reclassified accidents, actually caused by bogus parts, as due to "unapproved" parts.<sup>193</sup> This allegation was supported by an article in *Business Week* magazine, which alleged a cover-up within the FAA designed to hide the

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<sup>185</sup> See Mineta, *supra* note 74; see also Willy Stern, *Warning!*, BUS. WK., June 10, 1996, at 84 [hereinafter Stern]; see also *Safety and Airline Cost-Cutting*, TAMPA TRIB., July 10, 1996 (stating that ValuJet had purchased an inadequately refurbished engine from a Turkish airline); see also Boyer, *supra* note 26.

<sup>186</sup> See Stern, at 86 (quoting a head of quality control at a discount U.S.-based airline as stating "I've got bad parts. We've all got 'em, but who's going to admit it and lose his job?").

<sup>187</sup> See *id.*

<sup>188</sup> See *id.*

<sup>189</sup> See *id.*

<sup>190</sup> See *id.*

<sup>191</sup> See *id.* (stating that the FAA edited its database to reclassify accidents that had been attributed to bogus parts and placed them in the unapproved category).

<sup>192</sup> See *id.* See also *House Aviation Safety Hearing- Part 1*, CNN Noon News (June 25, 1996), available in LEXIS, NEWS Library, CNN File. Schiavo stated that an FAA administrator told her to get her investigation "out of bogus parts" because the already hurting airlines would only lose more money. *Id.*

<sup>193</sup> See Stern, *supra* note 185, at 86.

true scope of the problem.<sup>194</sup> The article noted that an internal FAA report listed “bogus” parts as the cause of 166 accidents between 1973 and 1993, a stark contrast to the FAA’s public claim that bogus parts had never caused a single accident.<sup>195</sup>

In testimony before the Senate, then-FAA Administrator David Hinson said that unapproved parts were “a safety concern”, but that they did not pose a significant safety problem.<sup>196</sup> Hinson noted that “[t]here has never been a U.S. air carrier accident in which an unapproved part has been determined to be the cause.”<sup>197</sup>

## 2. *The Scope of the Parts Industry*

To understand the inherent complexity of the parts problem, it is important to recognize that a single commercial aircraft typically contains millions of individual parts.<sup>198</sup> Any attempt to regulate further the parts industry must be planned with the understanding that there are literally billions upon billions of parts worldwide. In a market so vast, it should come as no surprise that bogus parts can make their way into virtually any hangar. *Business Week*, for example, asserts that “[e]very major domestic air carrier” has unknowingly purchased bogus parts at one time or another.<sup>199</sup> The sheer size of the airline parts industry has thus become a major impediment to change.<sup>200</sup> With billions of parts in the market, it is impossible for either the individual airlines or the FAA to verify the true lineage of any individual part.<sup>201</sup> A refurbished and reconditioned part, properly approved and ready to fly, is often indistinguishable on the outside from another which had only the equivalent of a fresh coat of paint.<sup>202</sup>

Yet another difficulty is the large number of parts distributors and the international scope of the parts market.<sup>203</sup> One esti-

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<sup>194</sup> See *id.*

<sup>195</sup> See *id.* at 87.

<sup>196</sup> DOT Inspector General Says FAA Lax in Enforcing Parts Regulations, AIR SAFETY WK., May 29, 1995, at 1 [hereinafter *DOT Inspector*].

<sup>197</sup> *Id.*

<sup>198</sup> See Stern, *supra* note 185, at 87. A Boeing 747, for example, has roughly 6 million parts. See *id.* The FAA estimates that roughly 26 million parts are changed every year. See *id.* at 90, See also DOT Inspector, *supra* note 196, at 2.

<sup>199</sup> Stern, *supra* note 185, at 89-90.

<sup>200</sup> See *id.* at 87-88.

<sup>201</sup> See *id.*

<sup>202</sup> See *id.*

<sup>203</sup> See *id.*



mate places the number of parts dealers between 2,000 and 5,000.<sup>204</sup> A recent incident exemplifies how the international dimension of the market makes preventive measures difficult. The cause of the June, 1995, fire in a ValuJet plane at Hartsfield International Airport in Atlanta was an engine which had been improperly overhauled in Turkey.<sup>205</sup> The repair station in Turkey, lacking the requisite FAA approval, merely plated over a cracked and corroded compressor disk and sold the part to ValuJet.<sup>206</sup> These "repairs" made the flaw undetectable to the eye and obviously did nothing to alleviate a problem which eventually resulted in the evacuation of 57 passengers from the plane.<sup>207</sup>

### 3. *Current Parts Regulation*

A brief explanation of the workings of the vast airline parts market will help illustrate both the lack of regulation and some of the difficulties that explain it. First, all manufacturers of airplane parts must be approved by the FAA, and parts made by them must be accompanied by paperwork demonstrating that they were made by an FAA-approved facility.<sup>208</sup> But the parts are then sold to unregulated dealers.<sup>209</sup> It is at this stage that bogus parts usually penetrate the market—the unregulated dealers sell such bogus parts to regulated airlines whose mechanics install them.<sup>210</sup>

Used and refurbished parts present even more problems. They are supposed to be checked for strength and precision after repair, in strict accordance with FAA regulations.<sup>211</sup> While FAA documentation (a "yellow tag") should accompany these parts to the aircraft before installation, there is no official seal, nor is there any impediment to simply typing up fraudulent documents.<sup>212</sup> Parts dealers have the authority to simply type the

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<sup>204</sup> See *id.* at 88.

<sup>205</sup> See *id.* at 84-85.

<sup>206</sup> See *id.*

<sup>207</sup> See *id.* at 85.

<sup>208</sup> See 14 C.F.R. §§ 21.2-21.621 (1996) (detailing certification procedures for aircraft products and parts).

<sup>209</sup> See Stern, *supra* note 185, at 88.

<sup>210</sup> See *id.*

<sup>211</sup> See 14 C.F.R. §§ 43.1-43.17 (1996) (detailing procedures for maintenance, rebuilding, and alteration of aircraft products and parts).

<sup>212</sup> See Stern, *supra* note 185, at 88 ("Anyone with a word processor can cook up fake paperwork, and yellow tags can be bought on the black market for \$100 in Miami, a center for the illegal-parts trade").

appropriate information on the yellow tag without further inspection by the FAA.

## B. SOLUTIONS

One possible solution to the parts problem would be for the airlines to self-police the system. Given the dramatic effect that even a single accident has on the business of a commercial airline, particularly a major national carrier, it would appear that the self-interest of the airlines should be sufficient to motivate them towards some form of self-policing. But, more often than not, the airline that finally purchases the bogus part does so unknowingly; the fraud is usually perpetrated several steps before the airline's purchase at the dealer level.<sup>213</sup>

Another proposal, that appears to make even more sense and is endorsed by the FAA is to require accreditation for dealers in parts.<sup>214</sup> Under this proposal, dealers must be accredited by the FAA, and airlines that purchase parts from such registered dealers would receive certain benefits. For example, the airlines would receive the benefit of increased assurance that these parts were not bogus or unapproved if the parts were purchased from an FAA accredited dealer, which is accountable to the FAA.<sup>215</sup> Airlines would also be prohibited from purchasing parts from unaccredited dealers, and dealers would lose their accreditation if they are found to have purchased parts from non-approved sources. This approach would provide a system under which the airlines would buy parts only from FAA-accredited dealers.

The airline self-regulation proposal, with respect to dealers, is an appropriate interim measure; it is relatively low in cost and would prompt airlines to seek out safe equipment sources. But, in light of the serious safety concerns, the aircraft parts industry requires even tighter controls. Another possible solution would be to levy heavy fines for airlines found to be using bogus parts or purchasing them from unaccredited dealers.

The toughest proposal, endorsed by the Office of Investigation (OIG) of the DOT, would have the FAA directly regulate

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<sup>213</sup> See *id.* at 88-90 ("Every major domestic air carrier—including American, Continental, Delta, Northwest, United, USAir, and TWA— has in recent years *unknowingly* bought unsafe or defective parts, according to court transcripts.") (emphasis added).

<sup>214</sup> See *DOT Inspector*, *supra* note 196, at 2.

<sup>215</sup> See Sandra Sobieraj, *FAA Toughens Rules Against Substandard Airplane Parts*, ASSOCIATED PRESS, Oct. 13, 1995.

parts dealers.<sup>216</sup> This approach would require a significant number of FAA inspections initially (to certify each of the dealers once the certification legislation was passed) and on an ongoing basis (to insure that the dealers were following the FAA's requirements and guidelines). But, former FAA Administrator David Hinson did not endorse the OIG's proposal, claiming that it would be prohibitively expensive, among other drawbacks.<sup>217</sup> Alternatively, perhaps the purchase and/or sale of bogus or unapproved parts should be made a crime, thus creating a criminal deterrent to dealers who purchase or sell such parts.

Most recently however, the FAA issued an advisory circular to provide information and guidance to the aviation community for detecting suspected unapproved parts and reporting them to the FAA.<sup>218</sup> This industry action is an important step towards reducing and eventually eliminating the use of unapproved parts, and thus increasing the safe operation of aircraft.

## VIII. FLIGHT DATA RECORDERS: A CASE STUDY - LOSS OF CONTROL OF 737s

### A. PROBLEMS

It is a tribute to the efforts of the NTSB and to the FAA that virtually every commercial aircraft accident is traced to a single cause. It is this aggressive style of accident investigation which is most likely responsible for the impressive safety record of the U.S. aircraft industry. Nevertheless, several recent incidents involving loss of control in 737s, the single most popular commercial aircraft in the sky, have brought into question the ability of the NTSB and the FAA to coordinate their efforts in solving a widespread problem.<sup>219</sup>

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<sup>216</sup> See *DOT Inspector*, *supra* note 196, at 2.

<sup>217</sup> See *id.*; see also Stern, *supra* note 185, at 90 (stating that the FAA thinks the proposal would be too expensive and would not deter those dealers bent on breaking the law).

<sup>218</sup> See FAA Advisory Circular No. 21-29B, *Detecting and Reporting Suspected Unapproved Parts*, (Feb. 20, 1998) <<http://www.faa.gov/abc/ac-chklst/ac211-97/AP3-97.pdf>>.

<sup>219</sup> See, e.g., Byron Acohido, *Grounded Eastwind Jet Is Back in Air— Investigators Haven't Found Cause of 737's Four In-Flight Malfunctions*, SEATTLE TIMES, July 3, 1996, at A1 (describing malfunctions which could have led to the third 737 unsolvable crash on U.S. soil this decade). On March 3, 1991, a United Airlines 737 took a sudden nose dive and crashed in Colorado Springs, and on September 8, 1994, a USAir 737 also crashed, in similar fashion, in Pittsburgh. The causes of these crashes have never been determined. *Id.*

## B. SOLUTIONS

A major problem that the FAA and the NTSB have recently addressed is the antiquated flight data recorders on many aircraft currently in use, including 737s.<sup>220</sup> In addition to interviews of the flight crew, flight data recorders enable the FAA to explain problems that develop during flight.<sup>221</sup> But, the flight data recorders on many of the 737s now in operation provide only inefficient readings on such parameters as time, pressure, altitude, air speed, acceleration, pitch, and thrust power.<sup>222</sup> Information obtained from modern flight data recorders, which record information such as the operational status of aircraft electrical and hydraulic systems, might increase the ability of the NTSB to determine the precise cause of an aircraft accident, thereby putting aircraft operators on notice of potential safety concerns. The lack of information from flight recorders has been identified as a reason why the cause of many of the recent loss of control episodes has not been found.<sup>223</sup>

The corrective actions taken by the NTSB and the FAA call into question the ability of these agencies to handle safety issues collectively in a timely manner.<sup>224</sup> In February 1995, the NTSB recommended that the FAA order all U.S. airlines to install state-of-the-art flight data recorders on all 737s by the end of 1995.<sup>225</sup> Although this goal was probably attainable, the warning

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<sup>220</sup> See Hall, *supra* note 30; see also *FAA Issues Compromise Proposal on Flight Data Recorders*, AIR SAFETY WK., July 15, 1996 [hereinafter *FAA Issues Compromise*].

<sup>221</sup> See Hall, *supra* note 30.

<sup>222</sup> See *id.*; see also Acohido, *supra* note 219 (stating that the recorders used on most 737s track only engine speed and general direction of travel).

<sup>223</sup> See Hall, *supra* note 30, (stating that the investigation as to the cause of the crash on September 8, 1994, of USAir Flight 427 near Pittsburgh, Pennsylvania killing all 132 people on board, has been hampered by the few parameters recorded by the airplane's flight data recorder); see also Acohido, *supra* note 219; *FAA Clarifying Certification Policy on Flight Control Jams*, AIR SAFETY WK., Jan. 6, 1997. It should be noted that the FAA recently issued an airworthiness directive (AD) requiring operators of the 737 to add procedures to their flight manuals which would enable pilots to maintain control of their aircraft during uncommanded yaw or roll conditions. This January 2, 1997 AD follows a discovery that a jam of the rudder power control unit could result in uncommanded rudder motion. The FAA has also ordered an immediate and continuing inspection of the 737.

<sup>224</sup> See *id.*; see also *FAA Issues Compromise*, *supra* note 220.

<sup>225</sup> See Acohido, *supra* note 219. It should be noted that the NTSB is an independent agency charged with investigating accidents in all modes of transportation. The NTSB cannot force other agencies, like the FAA, to accept any of its recommendations. See also J. Lynn Lunsford, *FAA Rejected 532 Proposals for Air Safety: Agency Says It Has Given Most of NTSB's Ideas Close Attention*, DALLAS MORNING NEWS, June 30, 1996, at 1A. Since its inception, over thirty years ago, the

was not heeded.<sup>226</sup> In June 1996, after an Eastwind 737 was grounded for a loss of control problem, NTSB chairman Jim Hall sent a letter to the FAA which compared this loss of control with other accidents and accused Hinson of failing to heed the February 1995 recommendations.<sup>227</sup> On July 9, 1996, rather than going along with the NTSB's proposal for an immediate retrofit of the 737s, the FAA finally issued a proposal that would give airlines *four years* to retrofit their fleets, 737s included.<sup>228</sup> According to the NTSB, such a time frame is too long.<sup>229</sup>

This series of events raised many troubling questions. Most importantly, why can not the NTSB and the FAA work together to remedy important safety issues, such as losses of control, as quickly and efficiently as possible? It is difficult to understand why interagency differences should delay information of important safety measures, while 737s take mysterious nose dives and their flight data recorders offer no insight into the cause.<sup>230</sup>

Most recently, however, the Federal Aviation Administration codified "a final rule requiring that certain airplanes be equipped to accommodate additional digital flight data recorder (DFDR) parameters".<sup>231</sup> This final rule follows both a series of safety recommendations issued by the NTSB, as well as the FAA's decision to revise the digital flight data recorder rules to upgrade recorder capabilities in most transport airplanes. These revisions will require the collection of additional information for a more thorough accident or incident investigation, so that the aviation industry will be able to predict certain trends

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government-operated FAA has rejected 532 recommendations of the independent NTSB. *Id.* FAA officials explain that the agency has adopted or is currently reviewing almost 83% of the 3,300 recommendations that the NTSB has presented since its inception. *Id.* Dave Thomas, director of the FAA's Office of Accident Investigations, asserts: "Out of the 3,300 recommendations that the safety board has made, there are less than 10 that the FAA has flatly rejected. . . . In every other case, we have done something that for whatever reason did not meet the expectations of the NTSB." *Id.*

<sup>226</sup> See *id.*

<sup>227</sup> See *id.*

<sup>228</sup> See *FAA Issues Compromise*, *supra* note 220.

<sup>229</sup> See Interview with James Hall, *supra* note 73.

<sup>230</sup> See *FAA Issues Compromise*, *supra* note 220 (citing a former NTSB investigator's statement that the FAA has no excuse for not requiring the nation's fleet to be retrofitted with state of the art flight recorders, rather than with the limited number of parameters mandated in the FAA proposed rule).

<sup>231</sup> 14 C.F.R. § 121 (codifying 62 Fed. Reg. 65202 (Dec. 11, 1997) (correcting 62 Fed. Reg. 38362 (July 17, 1997))).

and make necessary modifications.<sup>232</sup> This action indicates that the FAA is now taking the NTSB's recommendations more seriously.

## IX. HAZARDOUS MATERIALS

### A. INTRODUCTION

In the past, there have been few major aircraft accidents caused by hazardous materials shipments.<sup>233</sup> Hazardous cargo comprises only a small portion of the freight carried on U.S. transports.<sup>234</sup> Cargo specialists have noted that commercial airlines are doing a decent job of handling hazardous material shipments; however, dangerous items shipped without declaration continue to pose serious problems.<sup>235</sup>

In May 1996, a ValuJet DC-9 crashed in the Florida Everglades, killing 110 people. On August 19, 1997, the NTSB determined that the accident resulted from a fire in the Class D cargo compartment due to the actuation of one or more oxygen generators improperly carried as cargo. This improper carriage resulted from SabreTech's failure to prepare, package, identify, and track unexpended chemical oxygen generators properly before presenting them to ValuJet for carriage;<sup>236</sup> ValuJet's failure to oversee its contract maintenance program properly to ensure compliance with maintenance, maintenance training, and hazardous materials requirements and practices; and the FAA's failure to require smoke detection and fire suppression systems in Class D cargo compartments.<sup>237</sup> It was also determined that the FAA failed to monitor adequately ValuJet's heavy maintenance program and responsibilities, including ValuJet's oversight of its contractors and SabreTech's repair station certificate, and that the FAA failed to respond adequately to prior chemical oxygen generator fires with programs to address the potential hazards.<sup>238</sup> The fire was started by chemical oxygen generators which were stored in a compartment of the plane without smoke detectors or fire extinguishing systems. The generators sup-

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<sup>232</sup> See *id.*

<sup>233</sup> See Paul Proctor, *Undeclared Cargo Complicates Transport of Hazardous Materials*, AVIATION WK. AND SPACE TECH., May 27, 1996, at 31.

<sup>234</sup> See *id.*

<sup>235</sup> See *id.* at 32.

<sup>236</sup> SabreTech was under contract to provide maintenance service of the aircraft.

<sup>237</sup> See Hall, *supra* note 30.

<sup>238</sup> See *id.*

plied the oxygen needed for the fire. The NTSB is currently reviewing two other incidents involving fires caused by chemical oxygen generators carried on board commercial air transports.<sup>239</sup>

The DOT initiates, sets, and administers the rules for transportation of hazardous materials by U.S. airlines.<sup>240</sup> The Department's Research and Special Programs Administration (RSPA) oversees the FAA's hazardous materials program, which includes regulations regarding passenger and all-cargo aircraft, and requirements for packaging, labeling, and personnel training. In addition, the FAA has input on aviation-related hazardous materials issues and can suggest or comment on the DOT's proposed rule changes.

### B. PROBLEMS

There are a number of aviation safety issues raised by the transport of hazardous materials, most importantly the shipment of dangerous items without declaration. As of 1996, there were more than 500 annual reports of undeclared dangerous materials.<sup>241</sup> Whether unintentional or intentional, these shipments are generally discovered only if they have been packaged improperly. The crash of ValuJet Flight 592 is an example of an unintentional violation, in that the oxygen canisters on board the aircraft were mislabeled as empty. Intentional violations are often motivated by economic motives.<sup>242</sup> Hazardous materials surcharges are imposed by freight handlers and airlines because the required training of employees in dangerous goods handling can be costly.<sup>243</sup>

To prevent the illegal transport of hazardous materials, there is a need for more inspectors to enhance the FAA's ability to detect violations. Even prior to the ValuJet incident, the NTSB pointed out the need for more U.S. Transportation inspectors to spot check economically pressed small shippers, who are most likely to ignore rules for hazardous goods.<sup>244</sup> The amount of U.S. air cargo is expected to triple within the next 20 years, so a

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<sup>239</sup> See Edward H. Phillips, *NTSB Urges Review of Hazardous Materials*, AVIATION WK. AND SPACE TECH., June 10, 1996, at 26.

<sup>240</sup> See Interview with Robert Kelly, *supra* note 23.

<sup>241</sup> See Proctor, *supra* note 233.

<sup>242</sup> See *id.*

<sup>243</sup> See *id.*

<sup>244</sup> See *id.*

long-term approach for additional inspection services should be implemented now.<sup>245</sup>

There is also a need for improved education and training for shippers and airline workers who handle hazardous materials. The mechanics who prepared the oxygen-generating canisters for shipping on the ValuJet DC-9 did not have the correct caps to seal the canisters' activating mechanisms.<sup>246</sup> Instead, they improvised a rigging that they believed would disable the canisters; however, post-crash tests have convinced investigators that the makeshift rigging did not work.<sup>247</sup>

Finally, there is a need to keep incendiary chemicals and substances out of airplane compartments without fire suppression capabilities<sup>248</sup> or, at least, to insure that such compartments are equipped with early smoke and fire detection devices.<sup>249</sup> Until recently, Class D cargo compartments, which seal in order to cut off the flow of oxygen if a fire breaks out, were not required to be equipped with smoke detectors or fire extinguishing systems.<sup>250</sup>

### C. GOVERNMENT RESPONSE

As a result of the ValuJet fire and crash, the RSPA placed a temporary ban on the carriage of chemical oxygen generators until January 1997. In June 1996, the NTSB urged the FAA to: (1) immediately re-evaluate training and handling procedures in effect at all U.S. air carriers pertaining to the identification of unauthorized hazardous materials offered for transport; (2) revise training practices to ensure that airline personnel can iden-

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<sup>245</sup> See FAA Earmarks \$14 Million to Improve Transport of Hazmat, AIR CARGO REP., July 18, 1996.

<sup>246</sup> See Ken Kaye, *The Crash of ValuJet Flight 592; Path to Disaster*, SUN-SENTINEL, Aug. 11, 1996, at 1A.

<sup>247</sup> See *id.*

<sup>248</sup> See Gary Stoller, *Dangerous Cargo, Passengers in Peril*, USA TODAY, Apr. 27, 1998, at 1B (stating that two years after the ValuJet crash, a USA Today investigation found potentially lethal hazardous materials continue to be improperly shipped, packed, and handled on America's airlines).

<sup>249</sup> See Hall, *supra* note 30 (stating that the ability of the crew aboard Federal Express DC-10, which, on a September 5, 1996, flight from Memphis to Boston, reported smoke in the cockpit and diverted to land at Stewart International Airport to escape without injury before the airplane was destroyed by fire, was an illustration of the value of early smoke and fire detection where the aircraft was equipped with 12 smoke detectors, and the first indication of a problem was the illumination of lights for detectors 7, 8, and 9).

<sup>250</sup> See Randolph E. Schmid, *Regulators to Ban More Hazardous Materials Aboard Airliners*, ASSOCIATED PRESS, July 16, 1996.



tify unauthorized or hazardous materials; (3) prohibit carriage of chemical oxygen generators as cargo on board any passenger or cargo aircraft when their shelf life has expired and the chemical core has not been depleted; and (4) prohibit the transport of oxidizers and oxidizing materials in cargo compartments lacking fire or smoke detection systems.

In July of 1996, following the NTSB's recommendations, the FAA proposed the following: (1) the RSPA should permanently ban the transportation of oxidizers and oxidizing materials in specific compartments of passenger and cargo planes; (2) more hazardous materials should be added to the list of those already restricted for shipment on airlines; (3) the number of hazardous materials inspectors should be increased from 22 to 150; (4) there should be required labeling of Class C and D cargo compartments to enable easy identification by ground crews (Class C compartments contain smoke and fire detectors; Class D compartments do not); and (5) there should be improved education for shippers and airline workers who work with hazardous materials.

#### D. COMMENTS/CONCLUSIONS

The FAA reacted quickly to the ValuJet accident, but its initial response did not necessarily alleviate concerns. Some contended that the primary flaw in the FAA regulations was that they did not require improved fire suppression equipment. Since 1986, the FAA has required more stringent burn-through tests for Class D cargo compartment liners, but has only recently complied with NTSB pleas to require fire detection systems.<sup>251</sup> The FAA concluded that fire/smoke detection would not provide a significant degree of protection to occupants of aircraft and, as such, terminated rule-making on that issue.<sup>252</sup>

Recently, however, the FAA ordered fire detection and suppression systems for aircraft cargo compartments.<sup>253</sup> This rule meets a recommendation of the White House Commission on Aviation Safety and Security, which urged the installation of both fire detection and suppression system cargo holds.<sup>254</sup>

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<sup>251</sup> See Phillips, *supra* note 239.

<sup>252</sup> See *id.*

<sup>253</sup> See The Federal Aviation Administration, Official Internet Site, *FAA Orders Fire Detection and Suppression Systems for Aircraft Cargo Compartments*, (Feb. 12, 1998) <<http://www.faa.gov/apa/pr/pr.cfm?id=296>>.

<sup>254</sup> See *id.*

The regulations will restrict hazardous materials carried on planes and require fire detection and suppression systems; thus, the FAA's approach is now geared toward prevention and suppression. However, restricting hazardous materials does not guarantee compliance, and illegal materials may continue to find their way on board. Even under such regulations, the ValuJet crash might not have been preventable. If the accident was partly due to mislabeling the oxygen canisters as empty, they would not have been banned for containing hazardous chemicals. However, inspection of the improvised rigging caps could have revealed the mislabeling and avoided the tragedy. Thus, the FAA's recent action in requiring fire detection and suppression indicates that the FAA believes that such additional action is necessary to ensure that, in the event materials are carried on an aircraft illegally, airlines will be prepared to deal with the possible consequences.

## X. THE VALUJET MICROCOSM

The ValuJet disaster, while bringing to light the dangers of hazardous substance transportation, can also be viewed as a microcosm for two other important issues currently concerning the FAA which also affect aviation safety: political volatility and the dual role conflict.

### A. THE FAA'S POLITICAL VOLATILITY

Former FAA Administrator David Hinson's initial report to Transportation Committee Chairman Bud Shuster (R-Pa.) on June 11, 1996, indicated that ValuJet was safe enough to fly.<sup>255</sup> However, one week later, immediately after a White House meeting on the subject, the FAA promptly reversed its position and grounded the airline.<sup>256</sup> Reports circulated that the decision to ground the airline resulted from political pressure from the White House.<sup>257</sup> Hinson denied this charge, asserting that politics played no part in the decision, and stating that, "[i]n my three-year tenure as FAA Administrator, the White House has

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<sup>255</sup> See David Hinson, former FAA Administrator, *Report to Transportation Committee Chairman Bud Shuster* (June 11, 1996). See also *House ValuJet Hearing Focuses On FAA Oversight Performance*, AVIATION DAILY, June 26, 1996, at 511 [hereinafter *House ValueJet Hearing*].

<sup>256</sup> See *id.*

<sup>257</sup> See *id.* (quoting Chairman Shuster as stating, "We have no proof, but a rational person could conclude that political considerations played a role.").

never in any way asked or tried to direct, has never tempered or affected any of my decisions regarding safety issues.”<sup>258</sup>

In the ValuJet situation, any political pressure would have had the effect of making the skies safer. However, a branch of the government or its members might seek to compel the FAA to give the green light to an airline that the FAA had determined to ground. Would the agency improperly defer to the White House? Safeguards must be put in place to prevent political pressure from influencing an independent government agency, such as the FAA. Perhaps the House of Representatives should regularly review the timing of certain FAA decisions, as it did in the wake of the ValuJet disaster, to determine if political pressure played any part in safety-related FAA decisions.

### B. THE DUAL ROLE CONFLICT

The events leading up to the grounding of ValuJet in the middle of June, 1996, seem to demonstrate a conflict that may have plagued the FAA since its inception. ValuJet began service in October of 1993, and since that time the FAA mounted 21 separate investigations of the airline.<sup>259</sup> Investigators discovered that ValuJet planes were flying with their mandatory equipment broken.<sup>260</sup> The agency cited ValuJet pilots for routinely making bad cockpit decisions.<sup>261</sup> Ironically, by March of 1996, even the airline's internal reports revealed a litany of problems.<sup>262</sup> Among these were eight engine shutdowns *during flights*, thirteen forced returns to airports, and twenty eight problems with landing gear.<sup>263</sup>

Despite the FAA's admitted awareness of these problems, the airline was allowed to continue flying.<sup>264</sup> Naturally, some wonder why the FAA, an agency that is supposed to protect passengers from dangerous airlines, would allow ValuJet to keep flying.<sup>265</sup> The answer may have lain in the FAA's previous char-

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<sup>258</sup> Hinson, *supra* note 255.

<sup>259</sup> See Freeland, *supra* note 113.

<sup>260</sup> See *id.*

<sup>261</sup> See *id.*

<sup>262</sup> See *id.*

<sup>263</sup> See *id.*

<sup>264</sup> See *Discount Airline, FAA Roles Differ But Passenger Safety Concerns Both*, SUN SENTINEL, Sept. 4, 1996, at 18A [hereinafter *Discount Airline*] (discussing the fact that even after the May 11, 1996, crash of a ValuJet DC-9, the FAA insisted that ValuJet was safe to fly).

<sup>265</sup> See John Ritter, *Redrawing Safety Course: Some Argue Politics Blurs Mission; Latest Crash Highlights FAA's Conflicting Role*, USA TODAY, May 20, 1996, at 1B (quot-

ter: the agency's mandate was to regulate, as well as promote, the airline industry.<sup>266</sup> There lay the potential conflict which may have plagued the FAA since its inception in 1958.<sup>267</sup> The same agency that was charged with policing the industry was also to act as its principal public advocate.<sup>268</sup> Until the middle of May 1996, for instance, the FAA was using ValuJet as its deregulation poster child, touting it as an inspiration to the industry with its rapid growth and cheaper fares.<sup>269</sup> After all, ValuJet's cut-rate pricing was functioning just the way advocates of deregulation had promised—the aviation business was being “freed up” and the bigger airlines would be forced to follow suit by reducing their fares and making air travel accessible to everyone.<sup>270</sup>

The dual role conflict had also manifested itself outside the problem of discount airlines like ValuJet. For example, many critics have maintained that the FAA's downplaying of the bogus parts problem was a result of the FAA's close relationship with

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ing Vernon Grose, former member of the NTSB as stating; “[t]he public wants the agency to be a safety watchdog, but the public is paying for something it's not getting.”); Willy Stern, *Bogus Parts Have Turned Up In Commercial Jets. Where's the FAA?*, BUSINESS WK., June 10, 1996, at 84 (quoting an injured ValuJet passenger who escaped a burning plane in Atlanta as stating, “[a]ren't they supposed to make sure these planes are safe?”).

<sup>266</sup> See Feaver, *supra* note 111 (the FAA's charter states that it is to “provide for the regulation and promotion of civil aviation in such a manner as to best foster its development and safety.”) *Id.*

<sup>267</sup> See Ritter, *supra* note 265.

<sup>268</sup> See J. Lynn Lunsford, *FAA Rejected 532 Proposals For Air Safety; Agency Says It Has Given Most of NTSB's Ideas Close Attention*, DALLAS MORNING NEWS, June 30, 1996, at 1A (quoting a director for the National Association of Flight Attendants as stating, “[o]ften, the FAA has put promoting air commerce ahead of air safety.”).

<sup>269</sup> See Freeland, *supra* note 113; see also Elizabeth Gleik, *Does Air Safety Have a Price?; Human Error May Have Caused the Crash, But the FAA May Also Tolerate High Risk for Low-Cost Airlines*, TIME, May 27, 1996, at 40 (stating that after deregulation 161 airlines have gone out of business, but ValuJet, with aggressive fares managed to turn a profit in 1995 and was considered by the FAA as a credit to the industry).

<sup>270</sup> See Freeland, *supra* note 113. Despite the FAA's praise for ValuJet, the reality was that the airline was unsafe to fly. These dangers have been adequately described above. See *supra* notes 113-117, 259-263 and accompanying text. It should also be noted, moreover, that discount airlines are considered by some US officials to be twice as likely as major airlines to have an accident. *Id.* Budget airlines usually buy older planes to keep initial costs low. See also Gleick, *supra* note 269. These planes, in turn, require additional maintenance, but discount airlines subcontract out their repair work, which may compromise safety. *Id.*

the airlines.<sup>271</sup> Similarly, other critics have stated that the FAA failed to ground 737s, even in light of the problems with them, because of the FAA's deference to Boeing, a long time industry powerhouse and manufacturer of the 737.<sup>272</sup> Former Department of Transportation Secretary Frederico PeZa recently urged Congress to change the FAA's charter in order to make safety its primary aim.<sup>273</sup> Mr. PeZa claimed that the dual mandate "has caused some to believe that the FAA had to make choices between safety and promoting the industry."<sup>274</sup>

Recently, however, the FAA's charter has been revised to make safety the FAA's primary goal.<sup>275</sup> Thus, it is clear that the industry is focused on putting safety in the forefront. Nonetheless, the dual role conflict may continue to be a problem that needs to be addressed in order to improve air safety because the possible conflict permeates every major safety-related decision that the FAA makes—whether it be related to bogus parts, 737s, or discount airlines. The easiest and most obvious way to combat the conflict is to eradicate it. Airline Pilot Association President J. Randolph Babbitt commented that the change is "long overdue and is a major step in the right direction."<sup>276</sup> Not surprisingly, the only industry-related groups who did not call for elimination of the dual role mandate were those representing the airlines who, like the Air Transport Association, claimed that the FAA's then-current mandate was clear: "[f]rom the industry's point of view, the agency has focused first and foremost on safety and has never let its secondary mission of promoting aviation get in the way of its primary objective."<sup>277</sup>

Above all else, the federal government should ensure that the public gets the safety it should be getting. The public, in general, believes that the FAA is strictly a safety regulator, and the

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<sup>271</sup> Burnett, *supra* note 34; See also Stern, *supra* note 265 (quoting an FAA national branch agent as stating, "[t]he FAA worships at the altar of industry groups. It's a simple matter of economics. The airlines can't afford to clean up the problem, so the FAA lets the bad parts fly").

<sup>272</sup> Acohido, *supra* note 219.

<sup>273</sup> See Frederico PeZa, Remarks before Senate Committee on Commerce, Science, and Transportation Concerning Oversight of Aviation Safety (July 17, 1996, transcript available at 1996 WL 410108 (F.D.C.H.)).

<sup>274</sup> See *id.*

<sup>275</sup> See 49 U.S.C.A. § 40101(d)(1) (1998); see also Telephone Interview with Arlene Feldman, FAA Regional Administrator (Mar. 24, 1998).

<sup>276</sup> ALPA Reaction to FAA Changes, PR NEWswire, June 18, 1996, available in LEXIS, News Library, Wire Service Stories.

<sup>277</sup> *Id.*

way in which the FAA has handled crises like ValuJet only serves to undermine public confidence in the agency.<sup>278</sup> The best way to promote air travel to the public is through a guarantee of air safety.<sup>279</sup> Thus, a change in the FAA's charter is a positive first step in focusing the agency's mission on safety. However, whether this will have a practical effect remains to be seen.

In 1974, the long-since abolished Atomic Energy Commission, which promoted and developed nuclear reactors, as well as regulated their safety, was split into the Nuclear Regulatory Commission (NRC) and the Department of Energy (DOE).<sup>280</sup> Today, the NRC regulates the use of radioactive material and the DOE consolidates government energy programs.<sup>281</sup> It may be time for the same to be done in the aviation industry.

## XI. TERRORISM

### A. INTRODUCTION

Terrorism poses a threat to many aspects of life today, and air travel is no exception. Commercial aviation has historically been a favorite target of terrorists. In the early 1970s, more than 30% of all international terrorist attacks were targeted against some aspect of commercial aviation.<sup>282</sup> Since 1969, one-third of the seventy known bombing attempts against airlines worldwide have achieved some degree of success,<sup>283</sup> resulting in at least fifteen crashes and killing 1732 people.<sup>284</sup>

The face of terrorism, as it relates to air travel, has changed over the past two decades. The trend has moved away from airline hijackings and attacks on specific officials toward large-scale, indiscriminate violence and killings.<sup>285</sup> Portable missiles represent an entirely new category of threats, in the face of

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<sup>278</sup> See Pressler Questions FAA's Record Acting On, *Disclosing ValuJet Safety Information*, AVIATION DAILY, June 19, 1996 (quoting Senate Commerce Committee Chairman Larry Pressler (R-S.D.) as stating, "[t]he way FAA has handled release of ValuJet safety-related reports to Congress and the public continues to undermine confidence in the agency").

<sup>279</sup> *Discount Airline*, *supra* note 264.

<sup>280</sup> See Poole, *supra* note 119.

<sup>281</sup> See Ritter, *supra* note 265.

<sup>282</sup> See Brian M. Jenkins, *Flight 800's Legacy Trying to Stop Sabotage*, SAN DIEGO UNION-TRIBUNE, Sept. 15, 1996, at G-1.

<sup>283</sup> See Robin Wright and Richard T. Cooper, *U.S. Flights Vulnerable to Lagging Security*, L. A. TIMES, July 20, 1996, at 1.

<sup>284</sup> See Jenkins, *supra* note 282.

<sup>285</sup> See Walter Laqueur, *Postmodern Terrorism*, FOREIGN AFFAIRS, Sept. 19, 1996.

which, commercial aircraft are virtually defenseless.<sup>286</sup> Intelligence experts have warned that anti-American terrorism is growing, resulting in the threat of domestic terrorism against U.S. airlines becoming more real.<sup>287</sup>

## B. PROBLEMS

There is a perception that the United States has failed to adopt a coherent and effective policy to combat the growing problem of terrorism as it relates to commercial aviation.<sup>288</sup> In recent years, U.S. security measures have remained reminiscent of the past, in that the toughest measures were focused not on terrorist bombs on planes, but rather on potential hijackers and drug trafficking.<sup>289</sup> As a result, the methods used to protect American planes from bombs lag behind both the state of the art and the systems already deployed in many European countries. Furthermore, the sophisticated technology available to terrorists far surpasses security systems employed at many U.S. airports.<sup>290</sup> Senior U.S. counter-terrorism officials have noted that placing a bomb on a U.S. airliner is easier than smuggling either a gun or a knife on board.<sup>291</sup>

As a starting point, two areas are clearly in need of improvement. First, there is the need for expert technological devices to detect weapons and bombs that are not detected by mechanisms currently in use in most American airports (*e.g.*, metal detectors and x-ray machines).<sup>292</sup> In addition, airline security personnel represent a weak link in the chain of security.<sup>293</sup> Many of the systems in operation today are manual and depend on an operator's judgment, training, and experience to ensure optimum results.<sup>294</sup>

The identification of potential areas of improvement is only one part of the solution. There has also been much debate regarding the cost of improving existing security systems. There is

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<sup>286</sup> See Wright and Cooper, *supra* note 283.

<sup>287</sup> See Edward H. Phillips, *House Panel Focuses on Counter-Terrorism Methods*, AVIATION WK. AND SPACE TECH., Sept. 16, 1996, at 38.

<sup>288</sup> See, *e.g.*, Shirleyce Manning, *The United States' Response to International Air Safety*, 61 J. AIR L. & COM. 505 (Dec. 1995-Jan. 1996).

<sup>289</sup> See *id.*

<sup>290</sup> See Wright and Cooper, *supra* note 283.

<sup>291</sup> See *id.*

<sup>292</sup> See Vice President Al Gore, *supra* note 69.

<sup>293</sup> See *id.*; see also James Ott, *Security Rates 'Top Priority'*, AVIATION WK. AND SPACE TECH., Sept. 16, 1996, at 36. [hereinafter Ott]

<sup>294</sup> *Id.*

concern about the cost-efficiency of potential improvements, about who will actually pay for any improvements made, and about delays and inconveniences to passengers resulting from more elaborate security systems. Although, over the past decade, there have been many proposals to improve terrorism prevention tactics, their implementation has frequently been thwarted by the controversy over costs. Government officials believe that the airline industry, which has typically paid for its own security, has resisted many of the demands for improvement due to financial concerns.<sup>295</sup> On the other hand, the airlines, engaged in fierce competition, argue that past proposals have been unrealistic, and that they cannot be implemented without crippling the travel system with costly and frustrating delays.<sup>296</sup> Edward Merlis, senior vice president for government affairs of the Air Transport Association, has commented that there is a considerable difference between processing passengers and interdicting terrorists, and that the latter goes beyond the industry's responsibilities.<sup>297</sup>

Another perceived problem relating to terrorism and airline safety is the prior dual role of the Federal Aviation Agency and its continuing effect. The FAA, until recently, was responsible both for promoting safe air travel and enforcing security measures affecting aircraft and air terminals. Recently, however, the FAA's role was changed, making aviation safety its top priority. The FAA's security department is the regulatory arm of the government's counter-terrorist program. Since its inception, the department has focused on identifying security threats involving aircraft piracy, prescribing security requirements for airlines, aircraft, and airports, and providing technical assistance regarding these measures.<sup>298</sup> At the same time, its prior role as promoter of aviation may have mitigated the FAA's security enhancement demands, the continuing effects of which remain to be seen.<sup>299</sup>

Even with all the recent emphasis placed on the threat of terrorism, there remain some who believe that, in the end, the risk does not justify the cost of preventative measures. One commentator noted that for those travelling by plane during the six

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<sup>295</sup> See Mineta, *supra* note 74; see also Christopher Drew, *The Fate of Flight 800: Safety Stalled*, N. Y. TIMES, Aug. 13, 1996, at A1.

<sup>296</sup> *Id.*

<sup>297</sup> *Id.*

<sup>298</sup> See Manning, *supra* note 288.

<sup>299</sup> See *id.*; see also Drew, *supra* note 295.



billion air trips worldwide in the past eight years, the chances of dying in an incident involving an on-board bomb was less than 1 in 8 million.<sup>300</sup> Another commentator examined the cost of additional time necessary for the expanded pre-boarding processing of passengers. Estimating the extra time spent at one-half hour, and using a rate of \$10 per 1/2 hour per passenger, multiplied by 500 million passengers, the total cost would be \$5 billion per year. Since 1982, an estimated 548 people have died in air crashes in the United States linked to sabotage, or 37 lives per year. This would result in a \$135 million cost for each life saved per year, assuming new airport precautions actually cut sabotage deaths to zero.<sup>301</sup> Finally, an economist at Harvard has estimated that saving one life would cost approximately \$50 million, and that doing so at this price would be self defeating because it would drain resources from other life-saving purposes.<sup>302</sup> This type of cost-benefit analysis is difficult, however, because the value of human lives cannot readily be translated into dollars. In addition, this perspective does not take into account the sharp political costs of terrorism and the attending public perceptions of government inaction.<sup>303</sup>

### C. EARLY U.S. RESPONSES

In the wake of the 1988 bombing of Pan-Am Flight 103 over Lockerbie, Scotland, the FAA announced sweeping proposals to fight terrorism and revamp security measures.<sup>304</sup> The agency increased security requirements for searching and tracing baggage on overseas flights, proposed large fines against twenty-six airlines for failure to detect test objects and proposed a rule that required bomb-detection equipment at airports.<sup>305</sup>

The White House Commission on Aviation Security and Terrorism was formed by executive order in August 1989 in response to the bombing. The Commission endorsed many of the proposals that had been made by the FAA, and released its own

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<sup>300</sup> See Stephen Chapman, *Intrusive Airport Security Gives Terrorists a Victory*, POST AND COURIER, Sept. 13, 1996, at 19.

<sup>301</sup> See Peter Passell, *Economic Scene: In Airline Safety, Too Much Vigilance Can Be a Bad Thing*, N.Y. TIMES, Sept. 5, 1996, at D2.

<sup>302</sup> See Peter Passell, *Air-Safety Cost: What's a Life Worth?*, INT'L HERALD TRIB., Sept. 7, 1996.

<sup>303</sup> See Steven Erlanger, *Much Ado on Terrorism; How Grave, Really, Is the Threat?*, INT'L HERALD TRIB., Sept. 2, 1996.

<sup>304</sup> See Drew, *supra* note 295.

<sup>305</sup> See *id.*

report in May 1990, concluding that the air-security system was "seriously flawed," and calling for sweeping reform.<sup>306</sup> Among the recommendations the commission made were: (1) to use U.S. military forces against air terrorists; (2) to adopt foreign policies to isolate state sponsors of terrorism; (3) to notify all passengers in cases of credible bomb threats; (4) to cancel the FAA's order to install \$175 million worth of plastic-explosive detection devices (because such devices would probably not have detected the bomb that blew up Flight 103); (5) to create a high-level federal coordinator to oversee air security and intelligence; and (6) to update screening, training and testing of ground security crews, including criminal background checks of all airport workers. In November 1990, President Bush signed the Aviation Security Improvement Act, which mandated many of the improvements suggested by the Commission.

Unfortunately, many of these proposals never fully developed. The plan to require installation of millions of dollars worth of new bomb-detection machines at various airports generated debate over how well a bomb-detection machine must work before it is worth deploying.<sup>307</sup> A somewhat "all-or-nothing" mindset, as well as concerns over whether the technology worked well enough to justify its expense, ultimately caused the plan to founder.

The plan to require criminal background checks on many airline workers met with great resistance. Critics argued that there had never been a case of an employee with a criminal record joining in a terrorist plot, and that the proposal was thus a waste of money.<sup>308</sup> The FAA was finally able to adopt a diluted version of the rule in 1995.<sup>309</sup> This version provided that those already working for the airlines were exempted from the fingerprint checks, carriers were required to ask for job histories of new employees with access to restricted areas, and airlines were given the authority to seek checks of FBI fingerprint records as the need arose.<sup>310</sup>

A plan to impose heavy fines on airlines for failure to detect undercover test objects sent through baggage checks also generated negative feedback from the airlines. The FAA ultimately

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<sup>306</sup> See THE PRESIDENT'S COMMISSION ON AVIATION SECURITY AND TERRORISM, REPORT (1990).

<sup>307</sup> See *id.*

<sup>308</sup> See *id.*

<sup>309</sup> See Mineta, *supra* note 74.

<sup>310</sup> See *id.*

limited use of fines to only the most blatant cases where airport screeners failed to detect guns and bomb parts.<sup>311</sup>

#### D. RESPONSES UNDER THE CLINTON ADMINISTRATION

Even before the explosion of TWA Flight 800, a "broad consensus had developed in the government and aviation industry that terrorism posed a greater threat to air travel than ever before."<sup>312</sup> While the cause of the explosion remains uncertain, the initial reaction to this event thrust the issue of terrorism and airline safety back into the public spotlight and prompted rapid government reaction.

Soon after the TWA explosion, President Clinton asked Vice President Gore to chair the Aviation Safety and Security Commission. On September 9, 1996, the Commission made the following recommendations: (1) use automated profiling of all airline passengers based on information already available in computer data bases; (2) develop better ways to profile travelers so as to spot terrorists; (3) purchase sophisticated bomb detection devices; (4) train and deploy 115 new bomb-sniffing dogs and handler teams; (5) screen, train, certify and test airport security personnel; (6) match every bag loaded onto a plane with a passenger; (7) perform criminal background and fingerprint checks of airline and airport employees; and (8) expand the role of U.S. Customs Service, FBI, CIA and other agencies in detecting terrorists.<sup>313</sup>

Following the release of the Commission's report, President Clinton proposed \$1.1 billion in new spending to tighten airline security and fight terrorism.<sup>314</sup> This proposal tied together several long-standing anti-terror initiatives as well as the recommendations of the Commission. \$ 429 million dollars is slated for the aviation security measures urged by the Commission, and \$ 667 million is slated for anti-terrorism spending at a variety of federal agencies.<sup>315</sup>

The Clinton Administration also announced that the federal government will for the first time assume much of the cost and

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<sup>311</sup> See *id.*

<sup>312</sup> Roberto Suro, *Bomb Detection System Remains on the Drawing Board and Out of Airports*, WASH. POST, July 28, 1996, at A12.

<sup>313</sup> See Vice President Al Gore, *supra* note 69.

<sup>314</sup> See *id.*

<sup>315</sup> See John M. Broder, *President Targets Air Terrorism; Seeks \$1 Billion for Fight*, CHI. SUN-TIMES, Sept. 10, 1996, at 14.

responsibility for airline security.<sup>316</sup> This is consistent with the growing sentiment that terrorism is a national security problem, not merely an air safety issue. As Vice President Gore remarked, "[t]errorist actions against Americans on U.S. airliners represent an attack against the United States . . . there is clearly a national interest involved in combating this threat."<sup>317</sup> However, airlines will remain responsible for some expenses, such as the costs associated with the proposed passenger-baggage match program.<sup>318</sup>

#### E. COMMENTS/CONCLUSIONS

The steps the federal government has taken toward improving the safety of air travel seem at first glance comprehensive and promising. However, similar initiatives have been suggested before and have failed. Politics often impede the transition of proposals into reality, but there may also be good reasons why some past initiatives have not gotten very far. Today's proposals must be closely examined to determine whether they are sound as well as realistic.

One of the proposals calls for the purchase of sophisticated bomb detection devices, such as computer tomography detection systems (CTX-5000s) and vapor trace particle detectors. As before, this plan raises questions concerning both the cost and success rate of these technologies. A foolproof or "complete detection" system simply does not exist. The FAA has certified an explosives-detection machine, the CTX-5000, which costs approximately \$1 million.<sup>319</sup> In tests, it has sounded false alarms about 30% of the time, and it only processes 100 to 125 bags per hour (compared to the 450 bags per hour the airlines say is necessary to avoid delaying flights).<sup>320</sup> Because the systems currently in place are fairly inefficient, some think it is better to use the most effective approaches currently available, which will probably increase the chances of intercepting explosives. Most recently, however, the DOT and the FAA purchased "some 79 certified explosives detection systems and advanced technologies for screening of checked bags," with deployment to be com-

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<sup>316</sup> See Ott, *supra* note 293.

<sup>317</sup> Roberto Suro, *U.S. Government to Assume Primary Responsibility for Airport Security*, WASH. POST, Sept. 6, 1996, at A3.

<sup>318</sup> See *id.*

<sup>319</sup> See Roberto Suro, *Bomb Detection System Remains on the Drawing Board and Out of Airports*, WASH. POST, July 28, 1996, at A12.

<sup>320</sup> See *id.*

pleted in 1998.<sup>321</sup> "In addition, over 50 trace explosives detection devices were deployed in 1997," increasing the total from 78 to 128.<sup>322</sup> "About 365 more trace detection devices will be purchased and installed by the end of 1998."<sup>323</sup>

Another key component of the government's plan is passenger profiling. Profiling entails asking passengers specific questions in order to identify those travelers who pose the highest security risks. Airlines also use information they already have about travelers, such as frequent flier miles, to pre-screen passengers. The anti-terrorist profiling will build on a system already in use by the Customs Service for targeting potential drug couriers flying into the U.S.<sup>324</sup> Although profiling can be an effective way to screen for terrorism, it raises issues of violations of civil rights and privacy. The American Civil Liberties Union has already expressed concern about profiling, pointing out that use of profiles is not a sufficient basis for targeting passengers for extra scrutiny and will often involve the use of racial or ethnic stereotypes.<sup>325</sup> However, the Supreme Court has previously approved the use of profiling for drug searches at airports,<sup>326</sup> and could potentially endorse its use to combat terrorism in an appropriate case.

Moreover, Attorney General Janet Reno recently announced in a report to the Department of Transportation that the FAA-proposed Computer Assisted Passenger Screening System (CAPS) does not violate U.S. passengers' civil liberties.<sup>327</sup> CAPS is designed to establish a more controlled screening system in which possible human bias or airline employees' misapplication of selection criteria are eliminated.<sup>328</sup> CAPS was prototyped, tested with Northwest Airlines in 1997, and is being phased in by U.S. airlines in 1998.<sup>329</sup> The FAA tested passenger bag matching in 1997 and, on January 1, 1998, augmented the bag-matching

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<sup>321</sup> WHITE HOUSE COMMISSION ON AVIATION SAFETY AND SECURITY, THE DOT STATUS REPORT (Feb. 1998.) (visited Apr. 9, 1998) <<http://www.dot.gov/affairs/whcexec.htm>>.

<sup>322</sup> *Id.*

<sup>323</sup> *Id.*

<sup>324</sup> See Richard Sisk, *Experts Give Thumbs Down to Anti-Terrorism Plan*, CINCINNATI ENQUIRER, Sept. 15, 1996, at A20.

<sup>325</sup> See *id.*

<sup>326</sup> See *Florida v. Royer*, 460 U.S. 491, 502 (1983).

<sup>327</sup> See *Justice Department Says Proposed Passenger Profiling System Non-Discriminatory*, AIR SAFETY WK., Oct. 20, 1997.

<sup>328</sup> See *id.*

<sup>329</sup> See White House Commission on Aviation Safety, *supra* note 299.

program in conjunction with both manual screening and CAPS.<sup>330</sup>

The directive involving matching luggage with passengers on every domestic flight is intended to prevent a person from checking a bag and then not boarding the plane. However, airline professionals state that they have no idea how to carry out this plan, and have been given little guidance.<sup>331</sup> There are over 8 million airline departures annually from U.S. airports, involving more than 1 billion bags,<sup>332</sup> posing a huge logistical problem in terms of magnitude and space. Airports will need more room to hold large numbers of people for extended periods of time, as well as room in which to carry out the bag match. In addition, the current passenger-bag match in use for U.S. international flights does not always work well,<sup>333</sup> raising concerns about its successful use in domestic services as well. However, on February 12, 1997, the DOT issued a final rule to improve passenger manifests by requiring more information on passenger manifests for flights to or from the United States.<sup>334</sup>

The requirement for fingerprinting and background checks for airline personnel raises concerns similar to those made after the Lockerbie explosion. An Air Transportation Association official commented that the requirement looks like an intrusion with no enforcement payoffs because none of those persons charged or convicted of a terrorist act in recent years has had a criminal record.<sup>335</sup> In addition, it takes two to three months for police responses on background checks, a considerable lag time.<sup>336</sup> Moreover, criminal background checks on airport personnel are prohibited unless there is an unexplained period of unemployment within the prior ten years.<sup>337</sup> Thus, these requirements may have no beneficial impact at all.

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<sup>330</sup> See *id.*

<sup>331</sup> See Robert A. Rankin, *Airlines to Match Fliers, Luggage; Clinton Orders Anti-Terror Effort*, THE RECORD, Sept. 10, 1996, at A1.

<sup>332</sup> See Ott, *supra* note 293.

<sup>333</sup> See *id.*

<sup>334</sup> See White House Commission on Aviation Safety, *supra* note 321.

<sup>335</sup> See *id.*

<sup>336</sup> See *id.*

<sup>337</sup> See Interview with Robert Kelly, *supra* note 23.

## XII. TWA FLIGHT 800

On July 17, 1996, TWA Flight 800 exploded over the Atlantic Ocean shortly after taking off from Kennedy Airport.<sup>338</sup> The tragic loss of 230 persons on that flight stunned the world. It also prompted the largest transportation accident investigation in American, and perhaps world, history, led by the NTSB.<sup>339</sup> After nearly two years of the most extensive investigation in the history of aviation, the NTSB has not yet identified the probable cause of this accident. However, what has emerged is a focus on the explosive characteristics and the potential sources of ignition of the fuel/air vapors, which led to an explosion in the nearly empty center wing fuel tank,<sup>340</sup> as well as the expansion of the FAA's aging aircraft program to include such non-structural aircraft components as electrical wiring.<sup>341</sup>

## A. EXPLOSIVE FUEL/AIR MIXTURES AND POTENTIAL IGNITION SOURCES INSIDE FUEL TANKS

There have been some 25 fuel air explosions on aircraft since 1959.<sup>342</sup> Much still needs to be learned about the explosive characteristics of Jet A fuel, the elements required to ignite the vapors associated with fuels, the temperature and vibrational characteristics associated with airplane fuel tanks, and the vapor concentrations in the tanks.<sup>343</sup> In this regard, the NTSB has been conducting the following tests in laboratories all around the world: 1) laboratory studies of Jet A fuel; 2) flight tests on Boeing 747/100 aircraft; 3) chemical characterization of Jet A vapor; 4) Bruntingthorpe B-747/100 explosion tests; 5) quarter scale explosion testing; and 6) computer modeling.<sup>344</sup> NTSB Investigator Dan Bower recently stated in connection with the TWA Flight 800 investigation, "we saw a lot of warm tempera-

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<sup>338</sup> See Jim Hall, Remarks before the Subcommittee on Aviation Committee on Transportation and Infrastructure Regarding Accident Involving TWA Flight 800 (Oct. 13, 1997) (transcript available at <<http://www.nts.gov/Speeches/jh970710.htm>>).

<sup>339</sup> See *id.*

<sup>340</sup> See *id.*

<sup>341</sup> See White House Commission on Aviation Safety, *supra* note 299.

<sup>342</sup> See Interview with Hon. James Hall, *supra* note 73.

<sup>343</sup> See Jim Hall, Remarks before the FAA/SAE Conference on Fuel Flammability (Oct. 7, 1997) (transcript available at <<http://www.nts.gov/Speeches/jh971007.htm>>).

<sup>344</sup> See *id.*

tures in the components, which raises the question: how do we keep those warm temperatures from reaching the tank?"<sup>345</sup>

In addition, the NTSB has generally six primary ignition scenarios or theories currently being pursued as to the cause of the accident: 1) center tank scavenge pump; 2) static electricity; 3) fuel quantity indicating system; 4) No. 3 fuel tank electrical conduit; 5) small explosive charge; and 6) high speed particle penetration—all of which are still being investigated.<sup>346</sup>

As a result, the NTSB has made four recommendations to the FAA which urge both short-term and long term actions to reduce the potential for a fuel/air vapor explosion in the center fuel tanks of Boeing 747s, as well as in fuel tanks of other aircraft.<sup>347</sup> The NTSB suggested possible means to reduce the explosive potential of the fuel vapor, "such as adding cold fuel to the center tank before takeoff, providing insulation or other methods to reduce the transfer of heat from the air conditioning units beneath the center tank, or inerting the tank by replacing the explosive vapor with a harmless gas."<sup>348</sup> Although the aviation industry has not completely embraced these recommendations, the industry plans to undertake a survey of aircraft or major fuel tank inspection programs to verify the integrity of wiring and grounding straps; the conditions of fuel pumps, fuel lines and fittings; and the electrical bonding on all equipment including 747s, Airbuses and aircraft of other manufacturers.<sup>349</sup>

To date, a few of the most noteworthy FAA's actions in response to the recommendations issued by the NTSB are in eleven areas.<sup>350</sup> First, the FAA has completed work with Boeing "on a service bulletin that will provide instructions for inspection of fuel quantity indicating system (FQIS) wiring inside Boeing 747 fuel tanks."<sup>351</sup> This work has resulted in the issuance of an Airworthiness Directive (AD) by the FAA that requires the inspections.<sup>352</sup>

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<sup>345</sup> *Latest in Science and Technology News* (CNN television broadcast, Dec. 13, 1997).

<sup>346</sup> See Hall, *supra* note 338.

<sup>347</sup> See *id.*

<sup>348</sup> See *id.*

<sup>349</sup> See *id.*

<sup>350</sup> See Federal Aviation Administration, *Statement on NTSB TWA 800 Recommendations* (Apr. 7, 1998) <<http://www.faa.gov/apa/pr/apr/apa4098.html>>.

<sup>351</sup> *Id.*

<sup>352</sup> See 14 C.F.R. Pt. 39 (1999).



Second, "[t]he FAA has been working with Boeing on a service bulletin that will provide instructions to replace Honeywell series 1 through series 3 terminal blocks with newer blocks that have smooth surfaces and no sharp edges."<sup>353</sup> An AD following Boeing's service bulletin would incorporate such instructions.<sup>354</sup>

Third, "[t]he FAA is preparing a Special Federal Aviation Regulation (SFAR) that would require manufacturers to develop an FAA-approved fuel tank maintenance and inspection program based on the TWA 800 investigation."<sup>355</sup> "It would also require operators to have an FAA-approved fuel system maintenance program. The SFAR also will require manufacturers to review the original fuel system certification compliance findings and revalidate that failures within the fuel system will not result in ignition source."<sup>356</sup> "An evaluation of the need for electrical transient suppression, or surge protection, will be a part of this revalidation."<sup>357</sup>

Fourth, "[t]he FAA supports a manufacturer-initiated inspection program to assess the in-service condition of fuel systems in large transport airplanes."<sup>358</sup> Fifth, "[t]he FAA and NTSB continue to examine the effects of copper sulfur deposits on the FQIS components in the fuel tank."<sup>359</sup> Sixth, "[t]he FAA issued an NPRM AD on [December 1, 1997], to enhance the protection of the FQIS on Boeing 747s against transient electrical voltage spikes or short circuits."<sup>360</sup> "It requires installation of components to suppress electrical transients and/or the installation of wire shielding and separation of FQIS wiring from other aircraft wiring."<sup>361</sup> The actions specified by the NPRM are intended to prevent electrical transients induced by electromagnetic interference or electrical short circuit conditions from causing arcing of the FQIS electrical wiring or probes in the fuel tank, which could result in a source of ignition in the fuel tank.<sup>362</sup>

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<sup>353</sup> See *supra* note 350.

<sup>354</sup> See *id.*

<sup>355</sup> *Id.*

<sup>356</sup> *Id.*

<sup>357</sup> *Id.*

<sup>358</sup> *Id.*

<sup>359</sup> *Id.*

<sup>360</sup> *Id.*

<sup>361</sup> *Id.*

<sup>362</sup> *Id.*

Seventh, the FAA issued an AD on December 1, 1997, to require disconnection of the electrical connector to the scavenge pump of the center wing tank of certain Boeing Model 747 series airplanes.<sup>363</sup> This AD is prompted by findings from a design review and analysis of scavenge pumps installed on certain Boeing Model 747 series airplanes and is intended to prevent potential failures within the electrical motor assembly of the scavenge pump, which could result in leakage of fuel from the electrical connector into the main landing gear wheel well, or electrical arcing within the scavenge pump motor. These conditions could result in a fuel fire in the wheel well.<sup>364</sup>

Eighth, the FAA issued an AD on December 12, 1997, to require (i) repetitive inspections to detect damage of the sleeving and wire bundles of the boost pumps of the numbers 1 and 4 main fuel tanks and of the auxiliary tank jettison pumps; and (ii) replacement of any damaged sleeving and wires.<sup>365</sup> This AD is intended to detect and correct abrasion of the Teflon sleeving and wires in the bundles of the fuel boost pumps for the numbers 1 and 4 main fuel tanks and of the auxiliary tank jettison pumps, which could result in electrical arcing between the wires and the aluminum conduit and consequent fire or explosion of the fuel tank.<sup>366</sup>

Ninth, the FAA is continuing its review of different models of Boeing aircraft to determine if wire separation and shielding is needed.<sup>367</sup> Tenth, in January, 1997, the FAA directed the Aviation Rulemaking Advisory Committee (ARAC) to recommend how to reduce or eliminate explosive fuel/air mixtures which are potential ignition sources in fuel tanks.<sup>368</sup>

Eleventh, the FAA is investigating several ways to lessen the risk of explosion, including foam, nitrogen insertion, and venting.<sup>369</sup>

The FAA, as part of a continuing effort to address fuel tank ignition sources, has issued a NPRM AD, applicable to operators of Boeing 737 aircraft, intended to prevent possible ignition

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<sup>363</sup> 62 Fed. Reg. 63622 (1997) (to be codified at 14 CFR Pt. 39).

<sup>364</sup> *Id.*

<sup>365</sup> 62 Fed. Reg. 65352 (1997) (to be codified at 14 CFR Pt. 39).

<sup>366</sup> *Id.*

<sup>367</sup> *Id.*

<sup>368</sup> *Id.*

<sup>369</sup> See *NTSB Probes FAA Effort to Reduce Risk of Fuel Tank Explosions*, AVIATION DAILY, Dec. 15, 1997.

sources of fuel vapors in fuel tanks.<sup>370</sup> The proposed AD seeks to enhance the protection of the FQIS on Boeing 737 aircraft against short circuits.<sup>371</sup> It would require installing transient suppression components, and/or shielding and separation to the fuel system wiring that is routed to the fuel tanks from adjacent wiring.<sup>372</sup>

Most recently, the FAA "ordered airlines to inspect 737 fuel pump wires on planes with 30,000 to 40,000 flight hours within 45 days."<sup>373</sup> "The action- which also requires the addition of a second layer of Teflon protection on the wires- was taken following a detailed analysis of data obtained following the inspection of at least 195 aircraft with 40,000 or more hours of service."<sup>374</sup> "There are 1,140 Boeing 737s registered in the United States and 2772 worldwide."<sup>375</sup> On May 7, 1998, "the FAA ordered a 7-day inspection period for both the main and center pump wiring on planes with 50,000 or more hours."<sup>376</sup> On May 10, 1998, "that order was amended to drop the inspection of the center pump wires for the -100 and -200 series aircraft, require inspection of the main pump wiring before further flight, and to require the inspection of both sets of wires in the 40,000- to 50,000- hour category on the -300, -400 and -500 models."<sup>377</sup>

For aircraft having flight and mechanical conditions closely similar to those of TWA Flight 800, the aviation industry has an obligation to the public to learn more about the characteristics associated with Jet A fuel and its explosive tendencies, as well as the aging of electrical wiring associated with fuel pumps and systems, in order to make flying as safe as technologically possible.

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<sup>370</sup> See 14 C.F.R. Pt. 39 (1999); see also Federal Aviation Administration, *FAA Orders Changes to Boeing 737 Fuel Quantity Indicating Systems* (Apr. 16, 1998) (visited Apr. 8, 1999) <<http://www.faa.gov/apa/pr/apr/apa4398.html>> (setting forth preventative measures following a similar Airworthiness Directive proposed by FAA last November for Boeing 747-100, -200, and -300 series aircraft, which comment period closed May 27, 1998).

<sup>371</sup> See *id.*

<sup>372</sup> See *id.*

<sup>373</sup> Federal Aviation Administration, *FAA Extends Boeing 737 Order, Directs Center Pump Wire Check on -100, -200 Series* (May 15, 1998) (visited Apr. 8, 1999) <<http://www.faa.gov/apa/pr/may/apa6298.html>>.

<sup>374</sup> *Id.*

<sup>375</sup> *Id.*

<sup>376</sup> *Id.*

<sup>377</sup> *Id.*

## B. AGING FLEET

Aircraft age is a serious problem.<sup>378</sup> The average age of commercial airline fleets is continuing to increase.<sup>379</sup> By the year 2000, more than 2500 commercial aircraft in the United States may be flying beyond their original design lives.<sup>380</sup> In 1988, a major incident in which the top peeled off an Aloha Airlines Boeing 737 in flight, sweeping a flight attendant to her death, was blamed on weak maintenance of the old aircraft's structure.<sup>381</sup> In response, to help ensure the safety of aging jet frames and exteriors, the FAA greatly expanded its structural integrity inspection program and formed the Airworthiness Assurance Working Group (AAWG).<sup>382</sup> As a result, some of the FAA's most recent actions include the issuance of two ADs. The first AD pertains to certain areas of the wing struts of certain Boeing Model 747-100, -200, and -300 series airplanes.<sup>383</sup> "This action requires repetitive detailed visual and/or borescope inspections to detect discrepancies of certain areas of the wing strut."<sup>384</sup> "The actions specified in this AD are intended to detect and correct fatigue cracking and stress corrosion of the wing strut, which could result in failure of the strut-to-wing interface, and consequent separation of the engine and strut from the airplane."<sup>385</sup> The second AD "requires an internal visual inspection to detect cracks of the skin and internal doublers above main entry door 1 at body station 460, [of certain Boeing Model 747 series airplanes,] and various follow-up actions."<sup>386</sup> This AD was "prompted by reports indicating that multiple fatigue cracks were found in both internal skin doublers" and is "intended to detect and correct such fatigue cracking, which could result in reduced structural integrity of the fuselage and consequent rapid depressurization of the cabin."<sup>387</sup> In addition, the FAA has recently issued a Notice of Proposed Rulemaking (NPRM). The NPRM "would require repetitive detailed visual inspections for corrosion, and repetitive high frequency eddy current

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<sup>378</sup> See Hall, *supra* note 343.

<sup>379</sup> See Vice President Al Gore, *supra* note 69.

<sup>380</sup> See *id.*

<sup>381</sup> See *id.*, see also Jeff Cole, *Safety Board Grills Officials of Boeing At TWA Hearings*, WALL ST. J., Dec. 12, 1997, at B6.

<sup>382</sup> Lunsford, *supra* note 268.

<sup>383</sup> 63 Fed.Reg. 17932 (1998) (to be codified at 14 CFR Pt. 39).

<sup>384</sup> *Id.*

<sup>385</sup> *Id.*

<sup>386</sup> 63 Fed. Reg. 16098 (1998) (to be codified at 14 CFR Pt. 39).

<sup>387</sup> *Id.*

(HFEC) inspections for cracks, of the upper link assembly on the number 2 and number 3 engine struts, and corrective actions, if necessary.”<sup>388</sup> This NPRM was “prompted by reports of corrosion and cracks located at the four fasteners that attach to the aft end to the upper link assembly on the number 2 and number 3 engine struts,” and is “intended to prevent failure of the upper link due to cracking or corrosion, subsequent damage to other strut support structure, and in-flight separation of an engine from the airplane.”<sup>389</sup>

However, little is known about the potential effects of age on non-structural components of commercial aircraft.<sup>390</sup> Non-structural components include electrical wiring; connectors, wiring harnesses, and cables; fuel, hydraulic and pneumatic lines; and electro-mechanical systems such as pumps, sensors and actuators.<sup>391</sup> During the NTSB’s hearings into the explosion of TWA Flight 800, the Board questioned the failure of past reviews of aging aircraft to address worn wiring and fuel systems.<sup>392</sup> Twenty-five years old, Flight 800 aircraft was past its age limit.<sup>393</sup> Senator John McCain, Chairman of the Senate Committee on Commerce, Science and Transportation, has previously stated that frayed wiring seemed to be one of the likely causes of the explosion of TWA Flight 800.<sup>394</sup> The White House Commission on Aviation Safety and Security is also concerned that existing procedures, directives, quality assurance, and inspections may not be sufficient to prevent safety related problems caused by the corrosive and deteriorating effects of non-structural components of commercial aircraft as they age.<sup>395</sup> Thus, the Commission has recommended that the FAA work with airlines and manufacturers to expand the aging aircraft program to include non-structural components. Proposed plans include: full and complete tear-downs of selected aircraft scheduled to go out of service; the establishment of a lead-the-fleet research program; expansion of the FAA-DOD-NASA cooperative aging aircraft program; expansion of programs of the AAWG to include non-

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<sup>388</sup> 63 Fed. Reg. 17344 (1998) (to be codified at 14 CFR Pt. 39).

<sup>389</sup> *Id.*

<sup>390</sup> *See id.*

<sup>391</sup> *See id.*

<sup>392</sup> *See* Freeland, *supra* note 113.

<sup>393</sup> Interview with James Hall, *supra* note 73.

<sup>394</sup> Senator John McCain, Chairman of the Senate Committee on Commerce, Science and Transportation, on Larry King Live, *Improving Airline Safety* (CNN television broadcast, Dec. 11, 1997) [hereinafter McCain].

<sup>395</sup> *See* Acohido, *supra* note 219.

structural components; and encouraging the development of modern technical means to ensure and predict the continued airworthiness of aging non-structural components and systems.<sup>396</sup> However, Mary Schiavo, the former Inspector General of the DOT, indicated that inspectors cannot examine many components of commercial aircraft—that planes were built for a maximum safe lifespan of 20 years,<sup>397</sup> and, thereafter, may encounter trouble. Further, by the year 2000, 40 percent of the fleet is going to be over 20 years old.<sup>398</sup>

### XIII. CONCLUSION

This report has presented the major safety hazards plaguing the aviation industry today. As stated at the outset, flying is statistically very safe but it could be even safer. Controlled Flight Into Terrain, approaches to pilot training, language barriers between air traffic controllers and pilots, the need for modernization of the air traffic control system, failure to detect unapproved parts, the need for modernized flight data recorders, the dangers of transport of hazardous materials, the increasing risk of terrorism, the existence of explosive fuel/air mixtures and potential ignition sources inside fuel tanks, and the use of aging aircraft pose continuing challenges to the aviation industry's safety record. The current limitations in our aviation safety system represent a tremendous potential cost, in terms of both human lives and exposure to liability. Air travel is too vital to global commerce, economic development, world travel, and tourism to have its reputation and its future put at risk.<sup>399</sup>

In 1995, then-FAA Administrator David Hinson challenged the aviation industry to achieve "Zero Accidents."<sup>400</sup> The anticipated growth in aviation between now and the first quarter of the next century may lead to the occurrence of aviation accidents at a frequency that will be wholly unacceptable to the public.<sup>401</sup> Therefore, the industry can and must establish clear and

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<sup>396</sup> See *id.*

<sup>397</sup> See Burnett, *supra* note 34.

<sup>398</sup> See *id.*

<sup>399</sup> See Jane F. Garvey, Remarks at the International Air Safety Seminar (Nov. 4, 1997) (transcript available at <<http://www.faa.gov/apa/speeches/11497spjfg.htm>>).

<sup>400</sup> Federal Aviation Administration, *About the Office of System Safety* <[http://nadsdac.faa.gov/asy\\_internet/asy\\_about.htm](http://nadsdac.faa.gov/asy_internet/asy_about.htm)>.

<sup>401</sup> See Mineta, *supra* note 74.

focused methods of achieving a zero accident rate. The present FAA Administrator, Jane Garvey, has stated that the FAA's mission is to reduce the accident rate. In order to accomplish this mission, the FAA is adopting a two-pronged approach by (a) developing a focused safety agenda, and (b) by strengthening alliances and partnerships with all segments of aviation.<sup>402</sup> Moreover, the White House Commission on Aviation Safety and Security believes that improving levels of aviation safety, security and modernization should be a national priority, resulting in a re-definition of aviation safety and security for the rest of the world.<sup>403</sup> The American public deserves an absolute commitment to achieving this goal.

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Alvin Green

Anthony Michael Sabino

Alfred C. Jones

Peter Safirstein

Alfred C. Jones III

Ivars R. Slokenbergs

*The Aeronautics Committee would like to thank the following individuals for their assistance in preparing this report:*

Jonathan N. Santelli, Associate, Rogers & Wells;

J. Francis Cooke, Associate, Rogers & Wells;

Kimberly S. Loepp, Summer Associate, Rogers & Wells; and

Michelle Bowe, Former Associate, Rogers & Wells.

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<sup>402</sup> See White House Commission on Aviation Safety, *supra* note 321.

<sup>403</sup> See *id.*

*The Aeronautics Committee expresses its appreciation to the following individuals for their contributions in providing important information for this report:*

Phil Boyer, President, Aircraft Owners and Pilots Association;  
Arlene Feldman, Regional Administrator, Federal Aviation Administration;

Al Graser, Assistant Director of Airports, Port Authority of New York and New Jersey;

Robert Kelley, Director of Airports, Port Authority of New York and New Jersey;

Gary Kitley, Executive Director of the Council on Aviation Accreditation; and

Joseph Montone, FAA Designated Examiner, and Part 121 Check Airmen and Instructor.



